Amendments for the second stage of the North Sea sole and plaice multi-annual plan (EC regulation 2007/676)

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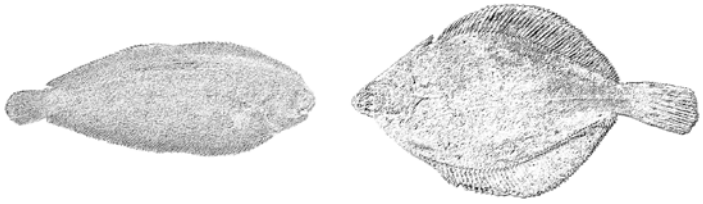

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Contents

Summary

A multiannual plan for sole and plaice in the North Sea was adopted by the EU Council in 2007 (EC regulation 676/2007). It describes two stages: a recovery plan during in stage 1 and a management plan in stage 2. The plan stipulates that stage 1 is deemed to be completed when both stocks have been within safe biological limits for two consecutive years. ICES concluded in spring 2013 that the objectives of stage 1 were met. Following article 5 ('Transitional arrangements') of the plan, the legislator should decide on a proposal from the Commission on amendments to the plan, if appropriate. Specifically, amendments to the objectives of the plan, (i.e. F targets, articles 4(2) and 4(3)), the TAC setting rules (articles 7 and 8) and effort management regulations (article 9) should ensure that stocks continue to be management on the basis of maximum sustainable yield (MSY).

This report compiles information from a number of management strategy evaluations investigating the effects of specific amendments to the current management plan. These reports , including ICES advice and STECF reports, establish appropriate reference points for exploitation of the stocks and examine how proposed amendments are likely to maintain management in accordance with MSY.

On the basis of these evaluations, the by the Dutch ministry proposed amendments to article 4 (F_{MSY} ranges for both stocks: F_{MSY} PLE = 0.20-0.30, F_{MSY} SOL = 0.20-0.25), article 9 (maximum allowable effort ceiling for the BT2 fleet set at the 2012 level) and allowing a system of banking and borrowing for both stocks are considered to ensure management of the stocks in accordance with MSY and the Precautionary Approach in the long term. In addition, some advice is provided with regards to articles 7 and 8 ('TAC-setting procedures') in terms of dealing with F_{MSY} ranges and it is also proposed to keep the 15% TAC change limits in the plan.

1. Introduction

A multiannual plan for sole and plaice in the North Sea was adopted by the EU Council in 2007 (EC regulation 676/2007; Appendix A). It describes two stages: a recovery plan during its first stage and a management plan during its second stage. ICES evaluated the plan as in agreement with the precautionary approach (Miller and Poos 2010; Simmonds 2010). Objectives are defined in the plan for the two stages: (1) rebuilding the stocks to within safe biological limits for stage 1 and (2) exploiting the stocks at MSY for stage 2. The plan stipulates that stage 1 is deemed to be completed when both stocks have been within safe biological limits for two consecutive years. TAC-setting procedures are provided to accommodate stage 1 as well as a transitional period during which an impact assessment and evaluation should take place to reconsider long-term objectives. The target fishing mortality rates for the two stocks (0.2 and 0.3 for sole and plaice respectively) were laid down in the plan at the time of its preparation, which was before ICES had conducted any analyses on appropriate fishing mortality levels in accordance with MSY.

The plaice stock has been within safe biological limits as defined by the plan since 2005. The sole stock has been within safe biological limits in terms of fishing mortality since 2008 and since 2012 in terms of the spawning stock biomass. Consequently, ICES concluded in spring 2013 that the objectives of stage 1 were met and provided advice based on the plan's TAC-setting procedure, acknowledging that the plan was used as a transitional measure until a revision of the plan for the purpose of fully defining stage 2 would be conducted. Following article 5 of the plan ('Transitional arrangements') the legislator should decide on a proposal from the Commission on amendments to the plan, if appropriate. Specifically, amendments to the objectives of the plan (i.e. F targets, articles 4(2) and 4(3)), the TAC setting rules (articles 7 and 8) and effort management regulations (article 9) can be made to ensure that stocks continue to be managed on the basis of maximum sustainable yield (MSY).

The Council of the European Union Inter-institutional Task Force on multiannual plans (8529/14, April 2014) has formed a common understanding of the use of Fmsy ranges in long term management plans (LTMPs):

"Concerning the target that corresponds to the MSY objective, the scientific bodies should normally be asked to give a range of Fmsy-values, which would then be fixed, based on this advice, by the Co-legislators in the plan. Fmsy ranges allow for an MSY-based management for a large number of stocks, and appear more robust to changes in the scientific advice. The Council would adopt measures on the fixing and allocation of fishing opportunities on an annual basis, based on scientific advice and in such a way as to achieve the objectives of the plan."

This task force document also highlights the potential benefit of Fmsy ranges for creating TACs that are balanced in a mixed fisheries context (i.e. can be simultaneously caught with limited discarding). This is important to limit the impact of 'choke' species on mixed fisheries, stocks that continue to be caught after their quota has been filled whilst fishing continues for quotas of other mixed fishery species. Hence, one of the proposed changes is to use a range of Fmsy values instead of using single values.

This report compiles information from a number of studies subsequent to the implementation of the plan, which have been conducted by ICES and STECF in relation to the management of the North Sea sole and plaice stocks. These studies included management strategy evaluations aimed at investigating the effects of specific amendments to the current management plan and analyses to establish appropriate reference points for exploitation of the stocks in accordance with MSY.

2. Assignment

The European Commission will likely soon prepare a proposal for fully defined objectives and TAC-setting procedures for stage 2 of the North Sea sole and plaice multi-annual plan. The Dutch ministry of Economic Affairs asked IMARES to conduct the present study to inform this process. The study is focussed at answering the following questions:

1. What are appropriate levels of fishing mortality in accordance with MSY? (Article 4)
2. Could TAC-setting procedures be laid down in the plan on the basis of a range of Fmsy values (as defined in the ICES advice), rather than on the basis of single values, without compromising sustainability of the stocks? (Articles 7 and 8)
3. Can further reductions in effort limitations (i.e. maximum allowable effort) for the fleet be ceased without compromising the sustainability of the stocks? (Article 9)
4. Can arrangements for quota flexibility from one year to the next be implemented without compromising the sustainability of the stocks? (Not presently specified in the plan itself)

3. Materials and Methods

The questions posed in the assignment were answered by collating information from a number of studies that have been conducted by ICES since the implementation of the plan. Some of that work was conducted in the context of ICES' implementation of the MSY framework in its advisory system. The results of that work can be found in a number of different working group reports and/or in advice sheets. Other work was done in response to special requests submitted to ICES to investigate particular issues. All evaluations included a 15% change limitation on the TAC. Therefore it is proposed to keep the 15% TAC change limits. Table 1 below provides an overview of the original sources (reports and other documentation) from which the information provided in the results section of this report was drawn.

Table 1. Sources of studies of which the results are compiled in the current document.

Question	*Sources*	*ICES advice*
F_{MSY} values	Miller and Poos 2010 WGNSSK report 2010 (ICES 2010) STECF evaluation (Simmonds, 2010,2011) Coers et al, 2012	ICES advice 2010, section 6.3.3.4
TAC setting procedures	MIXFISH report 2013 (ICES 2013)	ICES advice 2013, section 6.3.2
Effort limitations	Coers et al, 2012	ICES advice 2012, section 6.3.3.4
Quota flexibility	Brunel and Miller 2013	ICES advice 2013, section 6.3.5.3

4. Results

This section provides summaries of the work conducted in recent relevant studies and provides interpretation of them in the context of feeding this information into a full definition of the objectives and TAC-setting procedures of stage 2 of the management plan.

4.1 FMSY values

The target fishing mortality rates for the two stocks (0.2 and 0.3 for sole and plaice respectively) were laid down in the management plan at the time of its preparation, which was before estimates of appropriate fishing mortality levels in accordance with MSY were available. Now that the second stage of the plan, (which stipulates that management should be in accordance with MSY) has been reached it appears that the plan should be amended to include MSY reference points. Since the implementation of the plan, substantial progress has been made on the definition of MSY reference points, both by ICES and STECF, in several contexts:

1. Management Strategy Evaluation by IMARES to evaluate the plan (Miller and Poos, 2010) consisting of a detailed age-structured population model, including a range of different stock dynamics around a base case model. It incorporated uncertainty in stock recruitment function, measurement error and variability in the fishery. Several alternative stock dynamics and mixed fishery scenarios were tested. A range of management scenarios examined the likely impacts of varying aspects of the multi-annual plan on the stocks and the fishery, including different candidate F targets for each stock.
2. ICES implementing its MSY framework for providing advice in 2010 by means of the CEFAS ADMB approach (ICES, 2010), taking into account uncertainty in input parameters, such as weights at age, maturity and stock numbers at age.
3. STECF conducting an impact assessment which included an equilibrium analysis approach to determe Fmsy, taking into account uncertainty in stock recruitment relationships stochastically (Simmonds et al, 2010, 2011).
4. Management Strategy Evaluation by IMARES to evaluate (amongst others) a candidate F-target value for sole of 0.25 (Coers et al. 2012).

It was considered sufficient to describe the main conclusion here, since detailed explanations of the methodologies and results of the various analyses are available in the respective published reports.

North Sea plaice

The current management plan target for plaice is 0.3. The MSE simulations conducted by IMARES in 2010 indicated that F targets in the range of 0.15 to 0.3 all lead to the stock stabilising above Bpa, with a less than 5% probability of going below Blim. However, while long-term yields for Fs in the range of 0.2-0.3 showed negligible differences, yield declined at Fs lower than F=0.2. Correspondingly, ICES showed that an F range of 0.2-0.3 was considered appropriate as a basis for Fmsy, based on the CEFAS ADMB analyses. The equilibrium analyses by STECF (see Figure 1) similarly indicated that F targets over the range 0.15-0.3 all lead to similar long-term landings (because these values lie on a flat-topped Fmsy distribution). On the basis of these analyses the ICES WGNSSK working group has concluded that the mid-point in the range (F=0.25) is an appropriate value for Fmsy for North Sea plaice to be used as a single value for the purpose of giving advice in its MSY framework. At the same time, ICES acknowledged that, the stock should be considered to be sustainably fished (e.g. in stock status tables) for any F on the range 0.2-0.3, which includes the management plan target value (F=0.3).

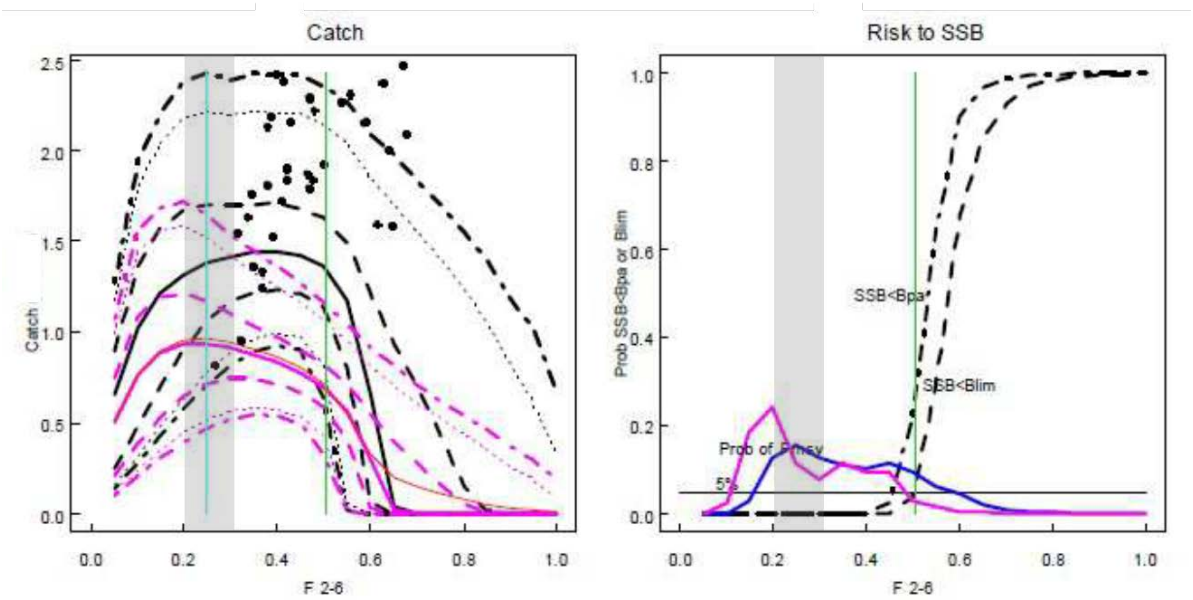

Figure 1. Equilibrium analyses results of North Sea plaice by STECF, exploring an F-range of 0.05-1.0. The grey shaded areas indicate the Fmsy range of 0.2-0.3. The left panel shows expected Catch (black lines) and Landings (pink lines) in 100,000 tonnes. The solid lines represent the medians and the dashed and dotted lines represent different quantiles (0.025, 0.5, 0.25, 0.5, 0.75, 0.95, 0.975). The right panel shows the probability of SSB going below Blim and Bpa. In Both the left and right panel, the green vertical line indicates the 5% probability of SSB below Blim. The pink and blue lines show the probability of Fmsy for landings and catch, respectively. Adapted from Simmonds et al (2010).

North Sea sole

The current management plan target for sole is 0.2. The MSE simulations conducted by IMARES in 2010 indicated that an F-range of 0.15-0.35 resulted in differences in landings both in the short term and long term. Maximum landings were shown to be realised between 0.20 and 0.25 (because these values lie on a flat-topped Fmsy distribution), with only slight differences in the short term. An F target of 0.15 produced substantially lower landings in both the short and long term, while an F target of 0.30 provided higher short term landings, but similar levels as the 0.2-0.25 range in the long term. However, for F values above 0.25 there was an increasing probability for SSB to go below Blim and so exploitation levels higher than this were not considered to be precautionary. The CEFAS ADMB analyses conducted at ICES suggested a wider F-range of 0.13-0.39 (based on stochastic equilibrium analysis). ICES concluded that an appropriate point estimate for F_{MSY} to be used for advice was 0.22, which is closer to the mid-point in the range suggested by IMARES. At the same time, ICES acknowledged that while the MSY framework advice should be provided on this basis, the stock should be considered to be sustainably fished (e.g. in stock status tables) for any F on the range 0.2-0.25. The equilibrium analyses by STECF gave an F_{MSY} value for North Sea sole of F=0.32 (see Figure 2). STECF considered that it was important to take the probability of SSB going below Blim into account and an F above 0.3 was considered to be not precautionary.

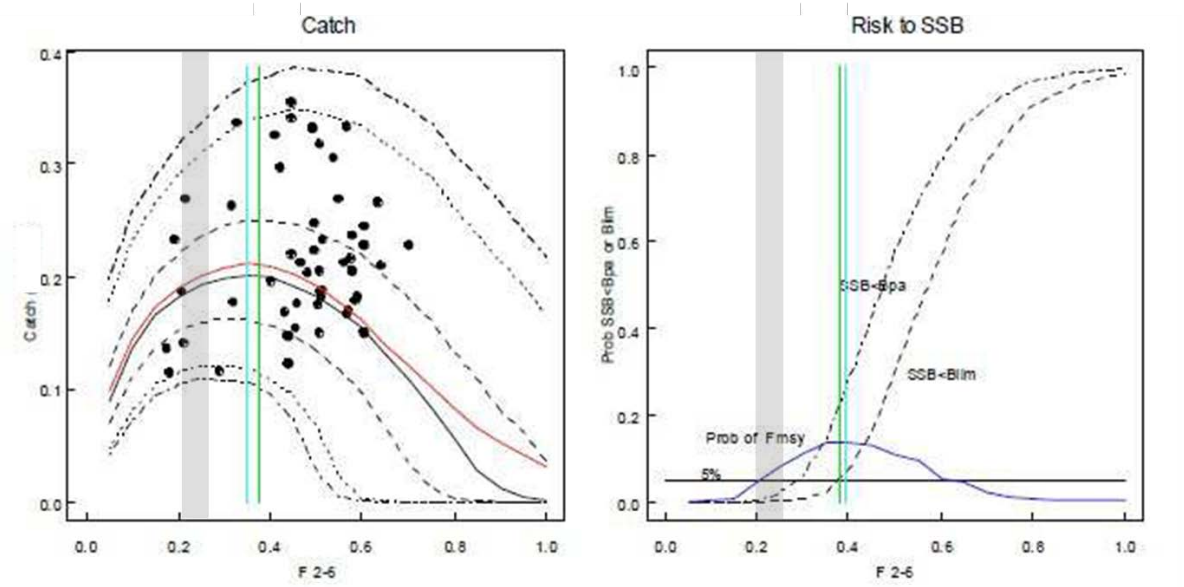

Figure 2. Equilibrium analyses results of North Sea sole by STECF, exploring an F-range of 0.05-1.0. The grey shaded areas indicate the Fmsy range of 0.2-0.25. The left panel shows expected Catch (black lines) and Landings (pink lines) in 100,000 tonnes. The solid lines represent the medians and the dashed and dotted lines represent different quantiles (0.025, 0.5, 0.25, 0.5, 0.75, 0.95, 0.975). The right panel shows the probability of SSB going below Blim and Bpa. In Both the left and right panel, the green vertical line indicates the 5% probability of SSB below Blim. The blue line shows the probability of Fmsy. Adapted from Simmonds et al (2010).

In a second Management Strategy Evaluation by IMARES in 2012, a target-F value of 0.25 was evaluated as in accordance with MSY. Estimated probability of SSB decreasing below Blim associated with this exploitation level was lower than in the previous simulations conducted (see also table 3 in the discussion section). This difference most is likely due to the starting points for the evaluations, since the stock increased to a level further above Blim in 2012 (starting point for second evaluation) compared to 2009 (starting point for first evaluation). While the analyses and discussions focussed on exploitation rates, a biomass trigger point (MSY Btrigger) of 35 000t for sole, corresponding to Bpa for the stock, was considered to be appropriate.

4.2 TAC setting procedures

Defining a range of Fmsy values that are appropriate for a stock does not necessarily imply that advice would consist of a range of suitable TACs. In a mixed species context, these ranges could rather be used in the TAC setting procedure to ensure that the annual advice is suitable for all species caught by the mixed fishery (or at least sole and plaice) given the likely effort the fishery would require to land individual TACs. This would still result in single TACs being advised for each stock even though a range of Fmsy values are considered in the scientific advice. e.g. TACs are determined used the best estimate of Fmsy. If the advised TAC for plaice was likely to limit the uptake of the sole quota, then a higher TAC for plaice could be advised as long as this higher TAC corresponds to an F from the range of Fmsy values for plaice. If this higher TAC would still limit the sole fishery, then a lower sole TAC could be advised, as long as this TAC corresponded to an F value from the range of Fmsy values for sole.

Such balancing of TACs should help lower discarding ratios while ensuring optimal sustainable management of stocks caught in mixed fisheries. They could also be adapted to take economic factors into account.

This style of approach is already applied by the ICES WGMIXFISH group (ICES, 2013). According to the single-stock advice for a number of North Sea stocks, scenarios of effort deployment of the various fisheries metiers are forecasted to predict the catches from the different stocks . These scenarios currently consider 'max' and 'min' levels (fishing stops when all quota species are fully utilised, or fishing stops when the catch for the first quota species is caught, respectively) amongst others. However, if each stock had a range of acceptable Fmsy values, then an 'optimal' scenario could be considered by allowing TACs to be derived from any F in the range for each stock.

This approach could easiest be demonstrated by applying a simplified version of the Fcube model used by WGMIXFISH to the sole and plaice stocks only. Of course, such approaches require significant effort and catch data and rely on assumptions of future effort deployment and relative catchability of different stocks that may be inaccurate.

4.3 Effort limitations

In May 2012, ICES received a special request from the Dutch Ministry of Economic Affairs, Agriculture and Innovation to evaluate a number of amendments to the multi-annual plan for North Sea plaice and sole which is currently in force by means of Council Regulation EC676/2007. This request stipulated *"to assess whether two proposed changes to articles 4 (management objectives) and 9 (effort regulation) of the multiannual plan would be consistent with the precautionary and MSY approach in conformity with ICES criteria"*. One proposed change was to article 9 of the plan implying to freeze the maximum allowable fishing effort (kW days) at the level of 2012, for as long as both the sole and plaice stocks are within safe biological limits. When one or both stocks fall back outside safe biological limits, than a reduction in maximum allowable fishing effort could be applied to help recover the stock(s) to within safe biological limits again.

IMARES conducted an MSE which was presented to ICES for final evaluation (Coers et al, 2012). A comparison was done between the current plan (with continuous adjustments of effort in line with the reductions in F for sole) and an amendment of the plan in which effort for the BT2 fleet would be frozen at the 2012 level. The same assumption was not included in the simulation model at the time for the BT1 fleet, because this fleet generally falls under the cod long term management plan and effort limitations for it hence follow from Council Regulation EC423/2008. See also section 5.2. In addition, to test the robustness of the management plan under different assumptions on how the fleet partitions effort between plaice and sole landings, the fixed effort limitation was tested under different scenarios. The comparison showed that fixing the effort limit did not result in different stock trajectories and in all scenarios, the proposed management plan remained precautionary. In the long term, landings could be expected to be somewhat higher, when effort reductions were ceased (see also table 3 in the discussion section).

4.4 Quota flexibility

In 2013 IMARES evaluated the impact of quota flexibility ('banking and borrowing') for both sole and plaice on the performance of the LTMP (Brunel and Miller, 2013). This evaluation found that interannual quota flexibility had limited impact on the long term sustainability and yield for the two stocks. These evaluations show that a 10% inter-annual flexibility on quotas for plaice and sole (banking and borrowing) does not compromise the precautionary nature of the long term management plan for these two stocks, assuming that it is suspended when stocks are outside of safe biological limits. Performance with regard to key criteria is very similar for both plaice and sole compared with or without inter-annual quota flexibility. Depending on how it is used, inter-annual quota flexibility could either increase or decrease interannual variation in landings. This work was then reviewed by ICES and an official advice was issued.

The interannual quota flexibility rules were interpreted as follows:

A. The percentage (maximum 10%) that can be banked or borrowed in year *y* (to be used or paid back in year *y*+1), will be calculated based on the initial quota for year *y*, without taking into account modifications of the year *y* quota arising from banking or borrowing in year *y*−1.

- For example, if in year 2013 a quantity X was banked to or borrowed from 2014, this quantity X can be used or must be paid back in 2014. Subsequent banking or borrowing that is done in 2014 (relating to 2015) will be based on the initial 2014 quotum (the country's quotum share of the TAC), without adding or subtracting quantity X.

B. The threshold rule to suspend interannual quota flexibility will be the stock being outside safe biological limits (SBL) which means that, according to the assessment performed in year *y*, either F(*y*−1) >Fpa or SSB(*y*)< Bpa, or both.

- If the stock is outside SBL in year *y* according to advice for year *y*+1, flexibility is allowed in year *y* (banking to/borrowing from *y*+1), but suspended between *y*+1 and *y*+2. Flexibility is reinstated when the stock is in good condition again. For example, if the 2013 advice for 2014 considers the stock outside SBL in 2013 (F2012, SSB2013):
  - no interannual quota flexibility will be allowed between 2014 and 2015;
  - interannual quota flexibility will still be allowed to continue in year 2013, and whatever amount is banked or borrowed during year 2013 can be used or must be paid back in year 2014.

- If the stock is inside SBL in year *y* according to advice for year *y*+1 (after a period of being outside SBL), interannual quota flexibility is allowed from year *y*+1 onwards (in year *y*+1 banking to/borrowing from year *y*+2 is allowed).
  - For example, if the 2013 advice for 2014 considers the stock to be inside SBL in 2013 (F2012, SSB2013) after a period of no interannual quota flexibility, interannual quota flexibility will be allowed again between 2014 and 2015.

5. Discussion

5.1 Response to the request

1. *What are appropriate levels of fishing mortality in accordance with MSY?*

The various studies presented show how different methods, assumptions and procedures for dealing with uncertainty in data and model outputs provide different values for Fmsy. Also, as fishery selectivity varies and growth rates of fish change over time, the value of Fmsy also changes over time. This makes defining single values of Fmsy very difficult, and perhaps inappropriate. It would be more appropriate to define a range of F values that satisfies precautionary considerations and ensures high yields. This is line with the final report from the inter-institutional taskforce (Council, European Parliament and European Commission) on multiannual plans (April 2004)

The ranges of Fmsy values currently used by ICES for these stocks are appropriate based on recent evaluations. The upper limit of these ranges take both yield and precautionary considerations (probability of SSB<Blim) into account and the lower limit of these ranges still ensure high yields. The point Fmsy values used by ICES fall within these ranges. However, the current point F target values in the LTMP may not be the most logical ones (since the sole target is on the lower boundary and the plaice target is on the upper boundary of the acceptable range).

2. *Could TAC-setting procedures be laid down in the plan on the basis of a range of Fmsy values (as defined in the ICES advice), rather than on the basis of single values, without compromising sustainability of the stocks?*

It is possible. Even though a range of TAC values could be provided from the range of Fmsy values, a more sensible approach would be to use the ranges of Fmsy values to balance the TACs of the two stocks in a mixed fisheries context. This could be done by using a simplified version of the ICES MIXFISH approach to advice.

3. *Can further reductions in effort limitations for the fleet be ceased without compromising the sustainability of the stocks?*

Yes. Effort of the main fleets exploiting these stocks has substantially reduced since the implementation of the LTMP. A recent full management strategy evaluation has shown that capping the maximum allowable effort level at the 2012 level does not compromise the sustainability of the fisheries on these stocks. This suggests that further reductions of effort limitations are not required.

4. *Can arrangements for quota flexibility from one year to the next be implemented without compromising the sustainability of the stocks?*

Yes. A recent evaluation considering a wide range of scenarios of how banking and borrowing could be applied for both the sole and the plaice stock showed no negative impact on the long term performance of the LTMP.

The proposed management plan evaluated by IMARES in 2012 (Coers et al. 2012) tested both capping the effort at the 2012 level and F targets for each stock corresponding to the upper limits of the ranges proposed for Fmsy for these stocks. TAC change limits (15%) were included in the HCR examined. The results of this evaluation (Table 2) show very low probabilities (<5%) of SSB < Blim in the medium term and yields in the range expected MSY values for these stocks. Though this evaluation did not include

banking and borrowing, the 2013 evaluation by IMARES (Brunel and Miller, 2013) showed that the impact of including this is unlikely to raise the probability of SSB<Blim to more the 5%.

Table 2. Summary of results for the comparison of the current management plan with the proposal. 'Effort adj.' = effort limit adjusted according to change in F, 'Effort cap' = Maximum allowable effort capped at the 2012 level. Target F values for each species are given. Adapted from Coers et al. (2012).

	North Sea plaice		**North Sea sole**	
	Current plan: **Effort adj. F=0.3**	Proposal: **Effort cap F=0.3**	Current plan: **Effort adj. F=0.2**	Proposal: **Effort cap F=0.25**
Effect on the stocks				
P(SSB<Blim); 2015-2020	0	0	0.01	0.01
P(SSB<Blim); 2016-2025	0	0	0.02	0.02
P(SSB<Bpa); 2016-2025	0	0	0.02	0.04
Effect on the fishery				
Mean landings; 2015-2020	112 101	115 198	16 179	17 887
Mean landings; 2016-2025	112 952	117 239	17 385	19 063

The assessments used in both the 2012 and 2013 evaluations and recent ICES assessments of the stock (2013,2014) are very similar. The plaice assessment has changed slightly (combining the BTS-ISIS and BTS-Tridens surveys), but this change did not significantly alter the outcomes of the assessment. Figure 3 shows the projected SSB and TACs for sole and plaice from the 2012 MSE (sole F target = 0.25, effort cap set at the 2012 level). For plaice there has been some downward revision in the estimate of stock size, but the increasing trend remains the same and the most recent estimate of SSB is within the confidence limits of the projections. TACs have been set at the maximum allowed 15% increase since the 2012 evaluation, corresponding to the median projected TAC in 2014 and the upper confidence limit in 2015. For sole, SSB has also been revised down slightly for recent years, but both assessments since the 2012 evaluation have estimated SSBs well within the confidence limits of the projection. The TACs set have been below those projected since management advice has continued to reduce F towards the target of 0.2 rather than towards 0.25 as was done in the projections.

In addition, for both stocks, the most recent assessments do not differ significantly from those used in the 2012 and 2013 evaluations in terms of estimated selectivity of the fishery, weights at age and stock-recruit relationship. These are the key parameters used in the estimation of Fmsy and in the population dynamics used in MSE evaluations. This consistency in the assessments of the stocks implies that the results of these recent evaluations are likely to still be valid.

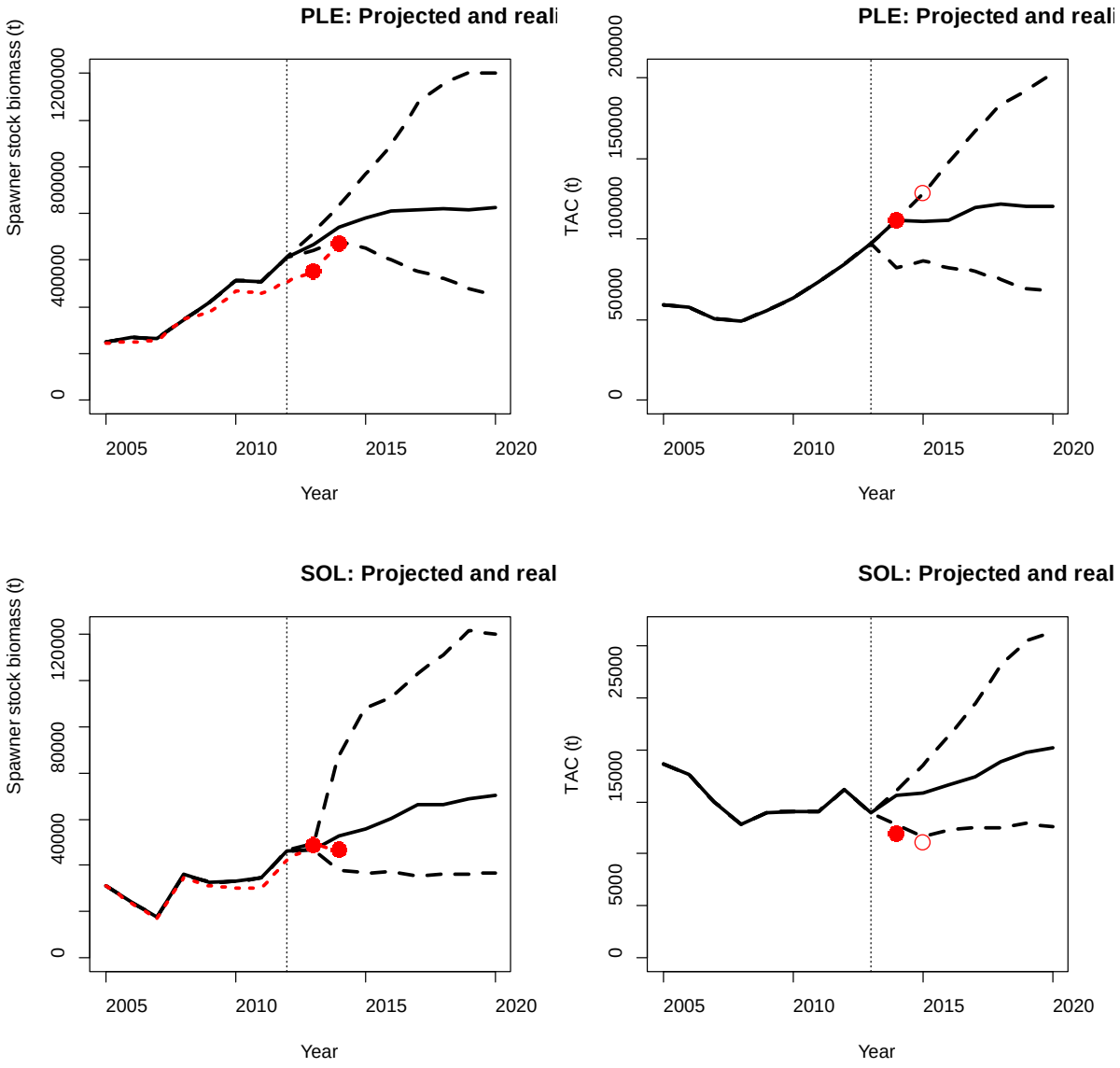

Figure 3. Projected and realised SSB and TAC for sole and plaice in the North Sea. Projections of future spawner stock biomass (SSB) and total allowable catch (TAC) come from the 2012 evaluation of the North Sea flatfish management plan (black lines, median values (solid) and 5% and 95% confidence limits (dashed lines) are plotted) in which sole Ftar=0.25 and effort is capped at the 2012 level. The red lines and points indicate the SSB results of the most recent ICES assessment of the stock (2014, unpubl.) and the TACs set for 2014 and 2015 (not yet finalised).

5.2 Interaction with other legislation

During the 2000's, when fuel prices were rising substantially and prices for plaice were decreasing, fishing effort of the beamtrawl fleet has shifted towards the southern North Sea to target sole. Juvenile plaice tend to be relatively abundant there, leading to relatively high discarding rates of plaice under the minimum landing size. With the recent substantial increases in biomass of the plaice stock, and thus to be expected increased catch rates, targeting plaice further North has and may become more economically favourable again. With the relatively low fishing mortality levels in recent years, it is also to be expected that a larger proportion of the population will be made up of older fish, of which the fishery could potentially benefit, since larger plaice receive higher prices on the market than small plaice. At present, the beam trawl fleet is limited in its ability to move northwards (where larger plaice are more abundant) by effort restrictions for the BT1 fleet, which are imposed on the basis of the cod management plan (Council Regulation (EC) No 1342/2008). E.g., the Dutch BT1 fleet used all its allowed effort in 2012 (STECF, 2014). There appears to be a trade-off between objectives in the cod management plan (limiting or avoiding cod catches) and the flatfish plan (making optimal use of the plaice and sole stocks). Especially when in the second stage of the flatfish plan, objectives are focussed on fishing in accordance with MSY, and possibly include social or economic objectives, allowing the fleet more flexibility to catch the plaice there where it can be most profitable would seem appropriate. This trade-off deserves some attention. Ongoing work on quantification of the levels of cod catch rates in different fleets (e.g. Kraan et al, 2013 for some Dutch fleets) should help the quantification of this trade-off. The introduction of the landing obligation will likely provide an additional strong driver for at least part of the beam trawl fleet to focus on a more northerly plaice fishery, to avoid the complications of the high unwanted bycatch of undersized plaice in the south.

Just as the spatial distribution of effort could potentially help resolve conflicts between minimising plaice discards and protection of cod, future management plans for mixed fisheries could also potentially use spatial management of fleet effort to prevent the bycatch of other (DLS) bycatch species. Better knowledge of the distribution of such stocks in relation to each other, e.g. from survey results, could be used to inform spatial management to prevent over-exploitation of those stocks, which due to reductions in single species TACs, could potentially turn into 'choke' species (i.e. species with relatively low TACs that prevent the full uptake of TACs of the target species of the fishery).

6. Conclusions

On the basis of numerous detailed evaluations, reviewed by both STECF and ICES, the proposed Fmsy ranges for both stocks, a maximum allowable effort for the BT2 fleet set at the 2012 level and a system of banking and borrowing for both stocks (Table 3) are considered to provide management advice that is in accordance with management obligations (MSY, PA) in the long term. Table 3 summarises the proposed amendments. It is also proposed to keep the 15% TAC change limits.

Table 3. Proposed changes to the plan found in accordance with MSY and precautionary approach.

	$F_{MSY\ (RANGE)}$	Max effort	Quota flexibility
LTMP Article:	Art. 4, 7 and 8	Art. 9	N.A.
Sole	0.20-0.25	Maintain limit at 2012 level	Yes
Plaice	0.20-0.30		Yes

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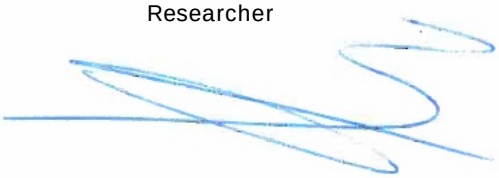
Justification

Report number : C088.14
Project number : 4308101086

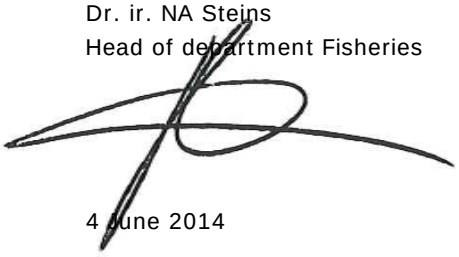
The scientific quality of this report has been peer reviewed by the a colleague scientist and the head of the department of IMARES.

Approved: T.P.A. Brunel
Researcher

Signature: 

Date: 4 June 2014

Approved: Dr. ir. NA Steins
Head of department Fisheries

Signature: 

Date: 4 June 2014

Appendix A. Council Regulation EC No 676/2007

I

(Acts adopted under the EC Treaty/Euratom Treaty whose publication is obligatory)

REGULATIONS

COUNCIL REGULATION (EC) No 676/2007

of 11 June 2007

establishing a multiannual plan for fisheries exploiting stocks of plaice and sole in the North Sea

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 37 thereof,

Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament [1],

Whereas:

(1) Recent scientific advice from the International Council for the Exploration of the Sea (ICES) has indicated that the stocks of plaice and of sole in the North Sea have been subjected to levels of mortality by fishing which have exceeded the level determined by ICES as being consistent with the precautionary approach, and the stocks are at risk of being harvested unsustainably.

(2) Advice from a committee of experts examining multi-annual management strategies indicates that the highest yield of sole can be taken at a fishing mortality rate of 0,2 on ages two to six years.

(3) The Scientific, Technical and Economic Committee for Fisheries (STECF) has advised that the precautionary biomass for the stock of plaice in the North Sea should be 230 000 tonnes, that the fishing mortality rate necessary to produce the highest yield from the stock of plaice in the North Sea in the long term is 0,3 and that the precautionary biomass for the stock of sole in the North Sea should be 35 000 tonnes.

(4) Measures need to be taken to establish a multiannual plan for fisheries management of the stocks of plaice and sole in the North Sea. Such measures, where they concern the stock of plaice in the North Sea, are to be established in the light of consultations with Norway.

(5) The objective of the plan is to ensure, in a first stage, that stocks of plaice and sole in the North Sea are brought within safe biological limits, and in a second stage and after due consideration by the Council on the implementing methods for doing so that those stocks, are exploited on the basis of maximum sustainable yield and under sustainable economic, environmental and social conditions.

(6) Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy [2] requires, *inter alia*, that to achieve that objective, the Community is to apply the precautionary approach in taking measures to protect and conserve the stock, to provide for its sustainable exploitation and to reduce to a minimum the impact of fishing on marine ecosystems.

[1] Opinion of the European Parliament delivered on 28 September 2006 (not yet published in the Official Journal).

[2] OJ L 358, 31.12.2002, p. 59.

I

(Acts adopted under the EC Treaty/Euratom Treaty whose publication is obligatory)

REGULATIONS

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THE COUNCIL OF THE EUROPEAN UNION,

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Having regard to the proposal from the Commission,

Having regard to the opinion of the European Parliament [1],

Whereas:

(1) Recent scientific advice from the International Council for the Exploration of the Sea (ICES) has indicated that the stocks of plaice and of sole in the North Sea have been subjected to levels of mortality by fishing which have exceeded the level determined by ICES as being consistent with the precautionary approach, and the stocks are at risk of being harvested unsustainably.

(2) Advice from a committee of experts examining multi-annual management strategies indicates that the highest yield of sole can be taken at a fishing mortality rate of 0,2 on ages two to six years.

(3) The Scientific, Technical and Economic Committee for Fisheries (STECF) has advised that the precautionary biomass for the stock of plaice in the North Sea should be 230 000 tonnes, that the fishing mortality rate necessary to produce the highest yield from the stock of plaice in the North Sea in the long term is 0,3 and that the precautionary biomass for the stock of sole in the North Sea should be 35 000 tonnes.

(4) Measures need to be taken to establish a multiannual plan for fisheries management of the stocks of plaice and sole in the North Sea. Such measures, where they concern the stock of plaice in the North Sea, are to be established in the light of consultations with Norway.

(5) The objective of the plan is to ensure, in a first stage, that stocks of plaice and sole in the North Sea are brought within safe biological limits, and in a second stage and after due consideration by the Council on the implementing methods for doing so that those stocks, are exploited on the basis of maximum sustainable yield and under sustainable economic, environmental and social conditions.

(6) Council Regulation (EC) No 2371/2002 of 20 December 2002 on the conservation and sustainable exploitation of fisheries resources under the Common Fisheries Policy [2] requires, *inter alia*, that to achieve that objective, the Community is to apply the precautionary approach in taking measures to protect and conserve the stock, to provide for its sustainable exploitation and to reduce to a minimum the impact of fishing on marine ecosystems.

[1] Opinion of the European Parliament delivered on 28 September 2006 (not yet published in the Official Journal).

[2] OJ L 358, 31.12.2002, p. 59.

(7) This Regulation should aim at a progressive implementation of an ecosystem-based approach to fisheries management, and should contribute to efficient fishing activities within an economically viable and competitive fisheries industry, providing a fair standard of living for those who depend on fishing North Sea plaice and sole and taking into account the interest of consumers. The Community bases its policy partly on the policy recommended by the appropriate Regional Advisory Council (RAC). A large part of the catches of plaice in the North Sea are taken together with catches of sole. The management of plaice cannot be addressed independently of the management of sole.

(8) Consequently, in drawing up the multiannual plan, account should also be taken of the fact that the high fishing mortality rate for plaice is due to a great extent to the large discards from beam-trawl sole fishing with 80mm nets in the southern North Sea.

(9) Such control of the fishing mortality rates can be achieved by establishing an appropriate method for the establishment of the level of total allowable catches (TACs) of the stocks concerned, and a system including limitations on permissible days at sea whereby fishing efforts on those stocks are restricted to levels at which the TACs and planned fishing mortality rates are unlikely to be exceeded, but are sufficient to catch the TAC allowed on the basis of the fishing mortality rates established in the plan.

(10) The plan should cover all flatfish fisheries having a significant impact on the fishing mortality of the plaice and sole stocks concerned. However, Member States whose quotas for either stock are less than 5 % of the European Community's share of the TAC should be exempted from the provisions of the plan concerning effort management.

(11) This plan should be the main instrument for flatfish management in the North Sea, and should contribute to the recovery of other stocks such as cod.

(12) Control measures in addition to those laid down in Council Regulation (EEC) No 2847/93 of 12 October 1993 establishing a control system applicable to the Common Fisheries Policy [1] need to be included in order to ensure compliance with the measures laid down in this Regulation.

[1] OJ L 261, 20.10.1993, p. 1. Regulation as last amended by Regulation (EC) No 1967/2006 (OJ L 409, 30.12.2006, p. 11).

(13) In 2006 the Commission initiated a debate concerning a Community strategy for a gradual reduction in fishing mortality in all major fisheries by means of a communication concerning the attainment of the maximum sustainable yield objective by 2015. The Commission has submitted this communication to the RACs for their opinion.

(14) The Commission has requested STECF to report on key aspects of impact assessment in relation to the management of plaice and sole, which should be based on accurate, objective and comprehensive biological and financial information. That impact assessment will be annexed to the Commission's proposal concerning the second stage of the multiannual plan.

(15) The multiannual plan should be deemed to be a recovery plan during its first stage and a management plan during its second stage, within the meaning of Articles 5 and 6 of Regulation (EC) No 2371/2002,

HAS ADOPTED THIS REGULATION:

CHAPTER I

SUBJECT-MATTER AND OBJECTIVE

Article 1

Subject-matter

1. This Regulation establishes a multiannual plan for the fisheries exploiting the stocks of plaice and sole that inhabit the North Sea.

2. For the purposes of this Regulation, 'North Sea' means the area of the sea delineated by the International Council for the Exploration of the Sea as Sub-area IV.

Article 2

Safe biological limits

1. For the purposes of this Regulation, the stocks of plaice and sole shall be deemed to be within safe biological limits in those years in which, according to the opinion of the Scientific, Technical, and Economic Committee for Fisheries (STECF), all of the following conditions are fulfilled:

(a) the spawning biomass of the stock of plaice exceeds 230 000 tonnes;

(b) the average fishing mortality rate on ages two to six years experienced by the stock of plaice is less than 0,6 per year;

(c) the spawning biomass of the stock of sole exceeds 35 000 tonnes;

(d) the average fishing mortality rate on ages two to six years experienced by the stock of sole is less than 0,4 per year.

2. If the STECF advises that other levels of biomass and fishing mortality should be used to define safe biological limits, the Commission shall propose to amend paragraph 1.

Article 3

Objectives of the multiannual plan in the first stage

1. The multiannual plan shall, in its first stage, ensure the return of the stocks of plaice and of sole to within safe biological limits.

2. The objective specified in paragraph 1 shall be attained by reducing the fishing mortality rate on plaice and sole by 10 % each year, with a maximum TAC variation of 15 % per year until safe biological limits are reached for both stocks.

Article 4

Objectives of the multiannual plan in the second stage

1. The multiannual plan shall, in its second stage, ensure the exploitation of the stocks of plaice and sole on the basis of maximum sustainable yield.

2. The objective specified in paragraph 1 shall be attained while maintaining the fishing mortality on plaice at a rate equal to or no lower than 0,3 on ages two to six years.

3. The objective specified in paragraph 1 shall be attained while maintaining the fishing mortality on sole at a rate equal to or no lower than 0,2 on ages two to six years.

Article 5

Transitional arrangements

1. When the stocks of plaice and sole have been found for two years in succession to have returned to within safe biological limits the Council shall decide on the basis of a proposal from the Commission on the amendment of Articles 4(2) and 4(3) and the amendment of Articles 7, 8 and 9 that will, in the light of the latest scientific advice from the STECF, permit the exploitation of the stocks at a fishing mortality rate compatible with maximum sustainable yield.

2. The Commission's proposal for review shall be accompanied by a full impact assessment and shall take into account the opinion of the North Sea Regional Advisory Council.

CHAPTER II

TOTAL ALLOWABLE CATCHES

Article 6

Setting of total allowable catches (TACs)

Each year, the Council shall decide, by qualified majority on the basis of a proposal from the Commission, on the TACs for the following year for the plaice and sole stocks in the North Sea in accordance with Articles 7 and 8 of this Regulation.

Article 7

Procedure for setting the TAC for plaice

1. The Council shall adopt the TAC for plaice at that level of catches which, according to a scientific evaluation carried out by STECF is the higher of:

(a) that TAC the application of which will result in a 10 % reduction in the fishing mortality rate in its year of application compared to the fishing mortality rate estimated for the preceding year;

(b) that TAC the application of which will result in the level of fishing mortality rate of 0,3 on ages two to six years in its year of application.

2. Where application of paragraph 1 would result in a TAC which exceeds the TAC of the preceding year by more than 15 %, the Council shall adopt a TAC which is 15 % greater than the TAC of that year.

3. Where application of paragraph 1 would result in a TAC which is more than 15 % less than the TAC of the preceding year, the Council shall adopt a TAC which is 15 % less than the TAC of that year.

Article 8

Procedure for setting the TAC for sole

1. The Council shall adopt a TAC for sole at that level of catches which, according to a scientific evaluation carried out by STECF is the higher of:

(a) that TAC the application of which will result in the level of fishing mortality rate of 0,2 on ages two to six years in its year of application;

(b) that TAC the application of which will result in a 10 % reduction in the fishing mortality rate in its year of application compared to the fishing mortality rate estimated for the preceding year.

2. Where the application of paragraph 1 would result in a TAC which exceeds the TAC of the preceding year by more than 15 %, the Council shall adopt a TAC which is 15 % greater than the TAC of that year.

3. Where the application of paragraph 1 would result in a TAC which is more than 15 % less than the TAC of the preceding year, the Council shall adopt a TAC which is 15 % less than the TAC of that year.

CHAPTER III

FISHING EFFORT LIMITATION

Article 9

Fishing effort limitation

1. The TACs referred to in Chapter II shall be complemented by a system of fishing effort limitation established in Community legislation.

2. Each year, the Council shall decide by a qualified majority, on the basis of a proposal from the Commission, on an adjustment to the maximum level of fishing effort available for fleets where either or both plaice and sole comprise an important part of the landings or where substantial discards are made and subject to the system of fishing effort limitation referred to in paragraph 1.

3. The Commission shall request from STECF a forecast of the maximum level of fishing effort necessary to take catches of plaice and sole equal to the European Community's share of the TACs established according to Article 6. This request shall be formulated taking account of other relevant Community legislation governing the conditions under which quotas may be fished.

4. The annual adjustment of the maximum level of fishing effort referred to in paragraph 2 shall be made with regard to the opinion of STECF provided according to paragraph 3.

5. The Commission shall each year request the STECF to report on the annual level of fishing effort deployed by vessels catching plaice and sole, and to report on the types of fishing gear used in such fisheries.

6. Notwithstanding paragraph 4, fishing effort shall not increase above the level allocated in 2006.

7. Member States whose quotas are less than 5 % of the European Community's share of the TACs of both plaice and sole shall be exempted from the effort management regime.

8. A Member State concerned by the provisions of paragraph 7 and engaging in any quota exchange of sole or plaice on the basis of Article 20(5) of Regulation (EC) No 2371/2002 that would result in the sum of the quota allocated to that Member State and the quantity of sole or plaice transferred being in excess of 5 % of the European Community's share of the TAC shall be subject to the effort management regime.

9. The fishing effort deployed by vessels in which plaice or sole are an important part of the catch and which fly the flag of a Member State concerned by the provisions of paragraph 7 shall not increase above the level authorised in 2006.

CHAPTER IV

MONITORING, INSPECTION AND SURVEILLANCE

Article 10

Fishing effort messages

1. Articles 19b, 19c, 19d, 19e and 19k of Regulation (EEC) No 2847/93 shall apply for vessels operating in the area. Vessels equipped with monitoring systems in accordance with Articles 5 and 6 of Commission Regulation (EC) No 2244/2003 of 18 December 2003 laying down detailed provisions regarding satellite-based vessel monitoring systems [1] shall be excluded from hailing requirements.

2. Member States may implement alternative control measures to ensure compliance with the obligation referred to in paragraph 1 which are as effective and transparent as these reporting obligations. Such measures shall be notified to the Commission before being implemented.

[1] OJ L 333, 20.12.2003, p. 17.

Article 11

Margin of tolerance

1. By way of derogation from Article 5(2) of Commission Regulation (EEC) No 2807/83 of 22 September 1983 laying down detailed rules for recording information on Member States' catches of fish [1], the permitted margin of tolerance, in estimation of quantities in kilograms live weight of each of plaice and sole retained on board of vessels that have been present in the North Sea shall be 8 % of the logbook figure. In the event that no conversion factor is laid down in Community legislation, the conversion factor adopted by the Member State whose flag the vessel is flying shall apply.

2. Paragraph 1 shall not apply concerning a species of aquatic organism if the quantity of that species retained on board is less than 50 kg.

Article 12

Weighing of landings

The competent authorities of a Member State shall ensure that any quantity of sole exceeding 300 kg or of plaice exceeding 500 kg, caught in the North Sea shall be weighed before sale using scales that have been certified as accurate.

Article 13

Prior notification

The master of a Community fishing vessel that has been present in the North Sea and who wishes to land any quantity of plaice or sole in a port or a landing location of a third country shall inform the competent authorities of the flag Member State at least 24 hours prior to landing in a third country, of the following information:

(a) the name of the port or landing location;

(b) the estimated time of arrival at that port or landing location;

(c) the quantities in kilograms live weight of all species of which more than 50 kg is retained on board.

The notification may also be made by a representative of the master of the fishing vessel.

[1] OJ L 276, 10.10.1983, p. 1. Regulation as last amended by Regulation (EC) No 1804/2005 (OJ L 290, 4.11.2005, p. 10).

Article 14

Separate stowage of plaice and sole

1. It shall be prohibited to retain on board a Community fishing vessel in any individual container any quantity of plaice or any quantity of sole mixed with any other species of marine organisms.

2. The masters of Community fishing vessels shall give inspectors of Member States such assistance as will enable the quantities declared in the logbook and the catches of plaice and of sole retained on board to be cross-checked.

Article 15

Transport of sole and plaice

1. The competent authorities of a Member State may require that any quantity of plaice exceeding 500 kg or any quantity of sole exceeding 300 kg caught in the geographical area referred in Article 1(2) and first landed in that Member State is weighed before being transported elsewhere from the port of first landing using scales that have been certified as accurate.

2. By way of derogation from Article 13 of Regulation (EEC) No 2847/93, quantities of plaice exceeding 500 kg and quantities of sole exceeding 300 kg which are transported to a place other than that of landing shall be accompanied by the declaration provided for in Article 8(1) of that Regulation. The exemption provided for in Article 13(4)(b) of Regulation (EEC) No 2847/93 shall not apply.

Article 16

Prohibition of transhipments of sole and plaice

A Community fishing vessel that is present in the North Sea shall not tranship any quantity of plaice or sole to any other vessel.

CHAPTER V

FOLLOW-UP

Article 17

Evaluation of management measures

1. The Commission shall, on the basis of advice from STECF, evaluate the impact of the management measures on the stocks concerned and the fisheries on those stocks, in the second year of application of this Regulation and in each of the following years.

2. The Commission shall seek scientific advice from the STECF on the rate of progress towards the objectives of the multiannual plan in the third year of application of this Regulation and each third successive year of application of this Regulation. The Commission shall, if appropriate, propose relevant measures, and the Council shall decide by qualified majority on alternative measures to achieve the objectives set out in Articles 3 and 4.

Article 18

Special circumstances

In the event that STECF advises that the spawning stock size of either or both plaice or of sole is suffering reduced reproductive capacity, the Council shall decide by qualified majority on the basis of a proposal from the Commission on a TAC for plaice that is lower than that provided for in Article 7, on a TAC for sole that is lower than that provided for in Article 8, and on levels of fishing effort that are lower than those provided for in Article 9.

CHAPTER VI

FINAL PROVISIONS

Article 19

Assistance under the European Fisheries Fund

1. During the first stage foreseen in Article 3 of this Regulation, the multiannual plan shall be deemed to be a recovery plan within the meaning of Article 5 of Regulation (EC) No 2371/2002, and for the purposes of Article 21(a)(i) of Council Regulation (EC) No 1198/2006 of 27 July 2006 on the European Fisheries Fund [1].

2. During the second stage foreseen in Article 4 of this Regulation, the multiannual plan shall be deemed to be a management plan within the meaning of Article 6 of Regulation (EC) No 2371/2002, and for the purposes of Article 21(a)(iv) of Regulation (EC) No 1198/2006.

Article 20

Entry into force

This Regulation shall enter into force on the 20th day following its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Luxembourg, 11 June 2007.

For the Council
The President
H. SEEHOFER

[1] OJ L 223, 15.8.2006, p. 1.