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Scientific, Technical and Economic Committee for Fisheries (STECF)

Report of the STECF Study Group on the Evaluation of Fishery Multi-annual Plans

(SGMOS 09-02)

23-27 NOVEMBER 2009, LISBON

Edited by E J Simmonds

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TABLE OF CONTENTS

SCIENTIFIC, TECHNICAL AND ECONOMIC COMMITTEE FOR FISHERIES (STECF)

STECF COMMENTS ON THE REPORT OF THE SG-MOS 09-02 WORKING GROUP LISBON, PORTUGAL, 25 NOVEMBER 2010

STECF OPINION EXPRESSED DURING THE PLENARY MEETING HELD IN NORWICH 26-30 APRIL 2010

STECF is requested to review the report of the **SG-MOS 09-02** of November 23 – 27, 2010 (Lisbon) (Annex 1), evaluate the findings and make any appropriate comments and recommendations.

TERMS OF REFERENCE

The STECF (SG-MOS 09-02) is requested to deliver an evaluation of the following plans:

1. R(EC) No 388/2006 – multi-annual plan for sole in the Bay of Biscay
2. R(EC) No 209/2007 – multi-annual plan for sole in the Western Channel
3. R(EC) No676/2007 – multi-annual plan for sole and plaice in the North Sea

by taking into account the framework specified below in Annex A.

If the SG-MOS 09-02 is not able to deal completely with all tasks and questions listed in the following framework, priority will have to be given to the evaluation of the multi-annual plan for sole and plaice in the North Sea.

STECF COMMENTS AND CONCLUSIONS

STECF welcomes the report of SG-MOS 09-02. STECF agrees with the conclusions of the subgroup regarding the evaluations of the management plans and draws the following additional conclusions from the report.

STECF observes that the generic framework was useful as guidance for evaluation. The report follows closely the outline provided, and the conclusions match the headings required by the Commission. STECF proposes continued use of the framework.

The timing of the review, at around 3 years after the plans were implemented, meant that only very limited analysis was possible. STECF notes that a period 48 months after implementation would be required for 3 years of biological data and 60 months for 3 years of economic data to be available (see Section 7 of the Working Group report[1]). Very limited knowledge and expertise with the EIAA-model was available to the group. Additional forecast for the years covered by the evaluation would also be very helpful. An improvement of the EIAA extended to include segments with less than 50% catches of species under a TAC regulation would also be very useful.

STECF notes that during the short period evaluated, the stocks have changed in the direction intended by the plans and to a greater extent than would have been the case just following the Commission's annual policy statement on the principles to set fishing opportunities. However, STECF cannot attribute the changes in the stocks to the implementation of the plans because there were many additional external factors also influencing the stocks. STECF notes that the adoption of a management plan aids annual decision making, and explicitly links annual decisions to the longer term aims of changing an exploitation rate from historic PA objectives towards new MSY targets. The use of multi annual plans reduces uncertainty in future potential yields in the fisheries concerned.

STECF notes that during the period of evaluation, TACs for sole appear to have been restrictive for all three stocks, and effective at achieving Fs close to target Fs. However, STECF notes that the 2009 TAC for sole in Western Channel did not restrict catches but only landings, as there were significant discards of legal sized sole. In contrast to sole in the North Sea, the catch of NS plaice seems not to have been directly controlled by TAC but may have been influenced through being a by-catch in the sole fishery, and through a change in discarding practices of plaice during the period evaluated. Nevertheless Fs on plaice appear to have declined more quickly than envisaged by the plan. This is thought to be partly because TACs were set too low due to errors (retrospective bias) in the stock assessments. The observed effort reductions in the fleets exploiting NS plaice and sole may also have contributed to the reductions in F on plaice.

STECF notes that there is potential to use spatial management to help balance catches with F targets for plaice and sole in the North Sea.

The absence of specific economic objectives in the plans has impeded a comprehensive economic evaluation. Ideally STECF would have compared observed outcomes to the projections in the impact assessment for NS sole and plaice; but this was not possible mainly because of shortage of economic data. STECF recognizes that although the plans were compared with an alternative management approach based on the Commission's annual policy documents, the economic consequences of different rates of change were not compared in the impact assessment and observations were not made for the evaluation.

STECF recognizes that the time lag in availability of economic data currently restricts the timing of this type of evaluation. Although data on costs and earnings are only available one year after the reference year, information on effort, catches, fish prices, fuel prices, and interest rates are available with a shorter time delay. The recommended changes for the organization and data compilation for the AER (see section 5.6 of this report) would enable the use of more up to date economic data in the evaluation. Therefore STECF recommends that the proposed changes in procedures and in the models should be made.

STECF notes that the temporal and spatial scale of economic data provided in the AER is often inappropriate for evaluating the economic performance of fleets operating under management plans, particularly for small stocks. There is a need to ensure that both economic and biological data from fleets that are involved in a multi-annual plan are collected at a scale that is appropriate to allow separation of that fishery from any other fisheries that these fleets are involved with. Provided such data are collected, it should be possible to provide these data using a specific data call.

The evaluation has shown that other factors, independent of the plans, such a fuel and fish prices, dominated economic performance during the period evaluated. STECF observed that the SGMOS 09-02 WG proposed fish prices as indicators for economic and social performance of the multi-annual plans. STECF agrees that information on prices is valuable in the evaluation of the economic effects of the plan, but does not agree on using these as an indication of the performance of the plan. Fish prices are affected by many more factors than those included in the plan.

ANNEX 1 REPORT OF THE STECF STUDY GROUP ON THE EVALUATION OF FISHERY MULTI-ANNUAL PLANS (SGMOS 09-02)

EXECUTIVE SUMMARY

All three plans were evaluated the conclusions are provided by plan.

Plaice and Sole in the North Sea - R(EC) No 676/2007

Regarding the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy: The plan provides an explicit long term objective for exploitation consistent with the CFP that would not be so clear without the plan. There are explicit tactical rules for transition to the long term exploitation objectives of the plan, which make the implementation of change more predictable for participants. Where effort regulation is coupled to changes in TAC there is improved consistency between fishing effort and catching opportunities.

Regarding removals: TACs appear to have been the more restrictive element of the multi-annual plan. The effort component of the plan does not appear to have been restrictive up to and including 2008. In practice the TACs that have been set for plaice under the multi-annual plan are similar to those that would have been set under the Commission’s TACs policy document (2009/224) (15% limit to annual changes in TAC). For sole the TAC likely to have been set without the multi-annual plan would have been slightly higher resulting in a much lower TAC being set in 2009 under the Commission’s TACs policy document (2009/224). The plan contains a maximum 15% constraint in annual quota change (increase or decrease) as the basic economic instrument. It was introduced to allow for easier adjustments on the fish markets to reduce price jumps.

Regarding the plan’s success in achieving its stated objectives: The stocks of plaice and sole are closer to the long term objectives than they were at the beginning of the plan and closer than they would have been under the alternative strategy based on the Commission’s annual policy documents. While these changes are supportive of the success of the plans, STECF has not been able to explicitly link the changes in state of the stocks to presence of the plans because there are many other variables that also affected the outcomes.

Regarding most important elements of the plan that would influence achievement of its objectives: Targets for exploitation are preferable to biomass targets to achieve biological sustainability. Long term targets combined with annual rules provide a useful basis for annual decision making on exploitation rates. Constraints on annual change in TAC are expected to be important for obtaining economic stability. This is expected also to improve acceptability to policy makers and stakeholders and therefore implementation.

Regarding elements of the plan that require revision: A clause concerning what to do if the assessments are no longer accepted is required. The long term targets for plaice and sole need to checked and evaluated for compatibility.

Sole in the Western Channel - R(EC) No 509/2007

Regarding the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy: It provides an explicit long term objective for exploitation consistent with the CFP that would not be so clear without the plan. The plan contains a maximum 15% constraint in annual quota change (increase or decrease) as the basic economic instrument. It was introduced to allow for easier adjustments on the fish markets to reduce price jumps.

Regarding the plan's success in achieving its stated objectives: As a stock assessment is currently not available it is not possible to identify whether changes have occurred.

Regarding specific indicators that would be useful for a future evaluation of this multi-annual plan: It seems that the indicators currently proposed do not provide sufficiently for some aspects that are important to some stakeholders such as the RACs. There is a need to consult with the stakeholders to see if some additional indicators are necessary and if so, ensure the provision of the necessary data.

Regarding elements of the plan that require revision: It is very important to add a clause describing what to do if the stock assessment is no longer accepted by ICES.

Sole in the Bay of Biscay - R(EC) No 388/2006

Regarding the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy: There are explicit tactical rules for transition to safe biological limits (the first objective of the plan) which makes the implementation of change more predictable for participants. In practice, the TACs that have been set under the multi-annual plan are thought to have been much less variable than would have been set under the Commission's TACs policy document relating to 2007-2009 (EC 2006c, EC 2008c, EC 2008), even though the average would have been similar.

Regarding the success of the plan in achieving its stated objectives: The stock of Bay of Biscay sole is now estimated to be inside safe biological limits, the objective of stage 1 of the plan. It is thought that in the absence of the plan the stock would not have reached safe biological limits until 2009, two years later than under the multi-annual plan. Medium term simulations indicate that reducing target F in steps of 10% from 2009 will result in reaching a target fishing mortality of Fmax in 2014. An alternative fixed TAC strategy (TAC = 4 200) would deliver a similar result with a 50% probability conditional on full compliance and recruitment similar to that observed in the past.

Regarding the most important elements of the plan that would influence achievement of its objectives: Targets for exploitation are preferable to biomass targets to achieve biological sustainability. Long term targets combined with annual rules provide a useful basis for annual decision making on exploitation rates. Constraints on annual change in TAC are expected to be important for obtaining economic stability. This is also expected to improve acceptability to policy makers and stakeholders and therefore implementation.

Regarding specific indicators that would be useful for a future evaluation of this multi-annual plan: It seems that the indicators currently proposed do not provide sufficiently for some aspects that are important to some stakeholders such as the RACs. There is a need to consult with the stakeholders to see if some additional indicators are necessary and if so identify with them the provision of the necessary data.

Regarding elements of the plan that require revision: A clause concerning what to do if the stock assessment is no longer accepted by whom? is required. Currently there is no long term target for stage 2 of this multiannual plan. As multi-annual management is now expected to be carried out under stage 2 there is an urgent need to select an appropriate target. Fmax appears to be a plausible Fmsy fishing mortality target.

Generic conclusions:

The group evaluated timing and considerations for when and how this type of plan should be evaluated, and concluded that long term plans should be considered over a number of years. The minimum period that should be considered for routine evaluation is 3 years after implementation. The timing of evaluations of plans needs to be linked to the availability of data. For example 3 years of biological data become available at approximately month 48 and 3 years of economic data at approximately month 60. Thus a full 3 year evaluation cannot be conducted until 5 years from the commencement of the plan.

1. INTRODUCTION

Background:

R(EC) No 2371/2002 (EC 2002) introduces the concept of multi-annual management plans for stocks at or within safe biological limits, as a means of moving towards multi-annual approach to fisheries management. Two types of multi-annual management plans are defined in the Regulation: recovery plans (Article 5) and management plans (Article 6). In practice both concepts have been combined into multi-annual / long term management plans.

According to rules established in adopted regulations, multi-annual plans have to be regularly assessed against their objectives. In addition, according to new Commission practices, management plans have to be evaluated with regard to their effectiveness, utility, efficiency (cost-effectiveness), sustainability. This means that the evaluation should consider all biological, fisheries, ecosystem, economic and social impacts.

Plans should also be reviewed where necessary and new options should be proposed. Here the evaluation is important in that it should help to judge the efficiency of the existing plan and to identify its main weaknesses. The conclusions will then form the basis for the elaboration of new options for a revised management plan. On top of that the evaluations will feed into a more general process of evaluating the interest and the sustainability of management plans as tools for the sustainability of the fisheries and the ecosystem management of the sea.

2. TERMS OF REFERENCE

The SG-MOS 09-02 is requested to deliver an evaluation of the following plans:

1. R(EC) No 388/2006 – multi-annual plan for sole in the Bay of Biscay

2. R(EC) No 209/2007 – multi-annual plan for sole in the Western Channel

3. R(EC) No676/2007 – multi-annual plan for sole and plaice in the North Sea

by taking into account the framework specified below in Annex A.

If the SG-MOS 09-02 is not able to deal completely with all tasks and questions listed in the following framework, priority will have to be given to the evaluation of the multi-annual plan for sole and plaice in the North Sea.

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4. TOR 1. REVIEW MULTI-ANNUALPLAN FOR SOLE IN THE BAY OF BISCAY R(EC) NO 388/2006

4.1. Background

The ICES advice for 2002 for this stock was for a recovery plan or no fishing. After consultations, the Commission presented a proposal to the Council in December 2003 (EC 2003). The European Parliament's opinion was reported in 2005 (EC 2005a), The plan eventually adopted in 2006 was Council Regulation (EC) No 388/2006 establishing a multi-annual plan for the exploitation of the stock of sole in the Bay of Biscay (EC 2006a, Appendix I)

The objective of the plan is laid down in Article 2 of Council Regulation:

1. The plan shall aim to bring the spawning stock biomass of Bay of Biscay sole above the precautionary level of 13 000 tonnes in 2008 or before and, thereafter, to ensure its sustainable exploitation.

2. This objective shall be attained by gradually reducing the fishing mortality rate on the stock."

Once the SSB is equal or above 13,000 tonnes (B_{PA}), a decision will be taken on a long-term target fishing mortality rate and a rate of reduction in the fishing mortality rate until this target is reached.

Since its inception there have been no modifications to the plan and the biomass reference point remains as advised by ICES SSB = 13,000 tonnes (B_{PA}).

No additional considerations have been taken since the implementation of the plan and the plan remains species specific.

There is a requirement in the plan that “the rate of progress towards the targets of the management plan should be evaluated in 2009 and in each third successive year”.

4.2. Design Issues

The multi-annual plan for the sustainable exploitation of the stock of sole in the Bay of Biscay has two implementation steps. The first one aimed to reach B_{PA} in 2008 or before. The second step is to reach a long-term target fishing mortality rate.

This long term target and the annual step changes in fishing mortality to reach it were not set in the plan, but they should be set once the spawning stock biomass has been evaluated by ICES to be equal to or above the precautionary level of 13 000 tonnes.

According to last ICES assessment of this stock (ICES 2009a), this aim has been reached in 2007. Consequently, STECF has been asked to advice on a new long-term target for fishing mortality and appropriate annual step changes (see Sections 4.4.5 and 4.8).

The control of fishing mortality rate has been mainly based on TAC enforcement (see Section 4.4.1.1) .

There are a number of general considerations regarding the effects of errors in the assessments and projections, comments on this topic are included in Section 7.4.

4.3. Enforcement and Compliance

Since the end of 2006, the French vessels must have a Special Fishing Permit when their annual landing of sole is above 2 t or if they have more than 100 kg on board. The Belgian vessel owners get monthly non transferable individual quota for sole. The amount is related to the capacity of the vessel.

The implementation of the plan appears to have been associated with a better enforcement of TACs (see Section 4.4.1.1). According to the information provided by the Commission no Community inspection has been carried out. Therefore no further information can be given.

4.4. Environmental Effects of the Plan

4.4.1. Evaluation of the effects of the management plan on the fishery

4.4.1.1. Changes in total TACs, catches, discards, landings, fishing mortality and effort

The TACs have been set at 4390 t in 2009 and at 4500-4600 t in the two preceding years (Table 4.4.1) (ICES 2009a). Since the implementation of the multi-annual plan in 2007, the landings are below the TACs, in contrast to earlier years (Table 4.4.1).

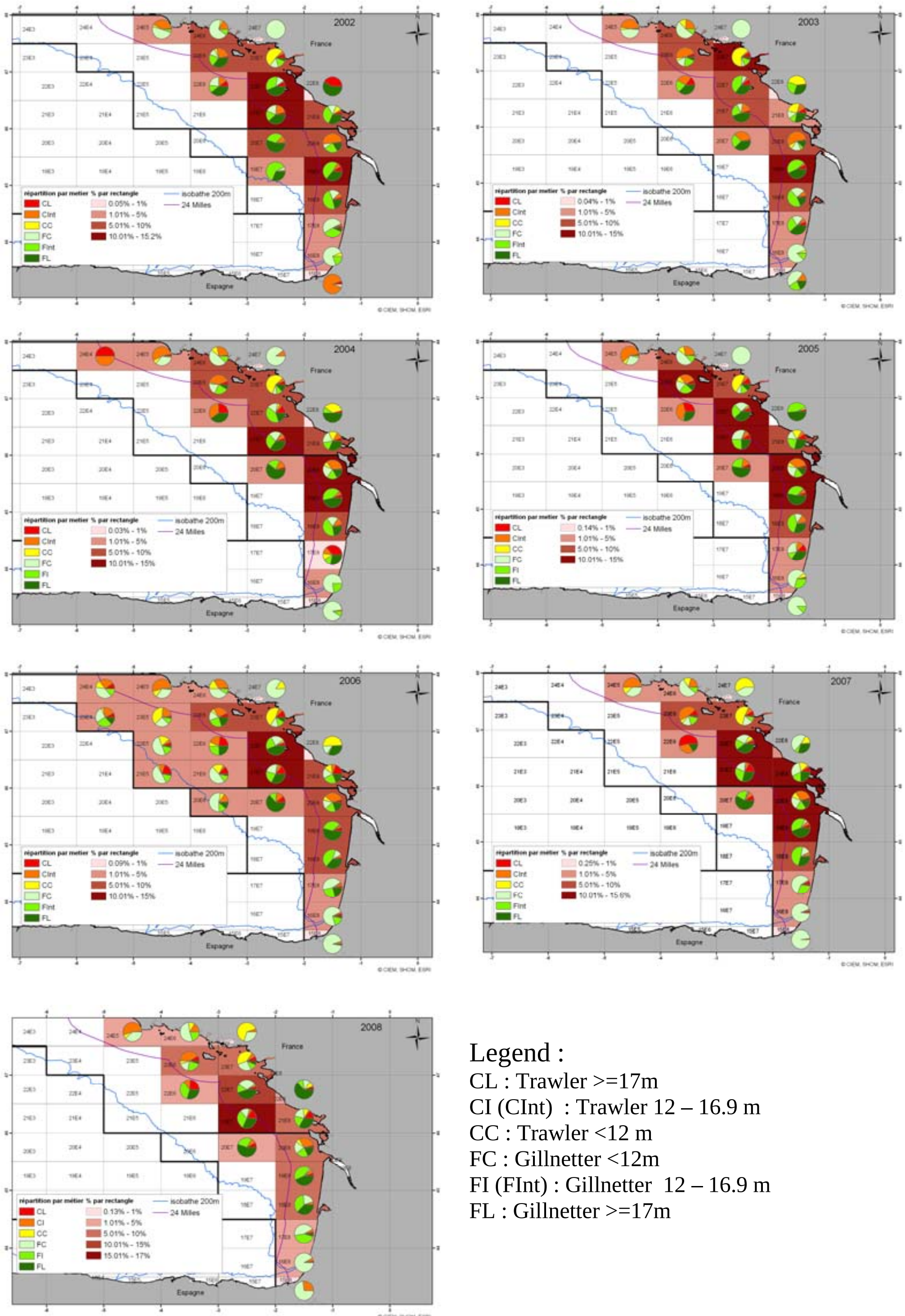
Year	TAC	Total landings (ICES Workings Groups)	Fishing mortality
2002	4 000	5 486	0.8107
2003	3 800	4 108	0.4755
2004	3 600	4 002	0.3644
2005	4 140	4 539	0.4299
2006	4 060	4 793	0.4219
2007	4 540	4 363	0.3772
2008	4 582	4 300	0.3756

Table 4.4.1. Bay of Biscay sole TAC, landings and fishing mortality from 2002 to 2008

Available estimates show that discards of Bay of Biscay sole are limited. The fishing mortality has decreased in recent years (Table 4.4.1).

4.4.1.2. Changes spatial distribution of the fishery

The French fleet contributes to more than 90% to the total landings. The rest is landed by Belgian beam trawlers. Spatial distribution of catches of the French fleet by gear (trawl or fixed net) and by vessel length class (Figure 4.4.1) shows year to year variation but no specific effect of the multi-annual plan. Also no changes in the spatial distributions of days at sea by gear and by vessel length class from 2006 to 2008 are discernable (Figure 4.4.2 to 4.4.8).



Legend :
CL : Trawler >=17m
CI (CInt) : Trawler 12 – 16.9 m
CC : Trawler <12 m
FC : Gillnetter <12m
FI (FInt) : Gillnetter 12 – 16.9 m
FL : Gillnetter >=17m

Figure 4.4.1 : Sole in the Bay of Biscay: catch distribution of the French fleet

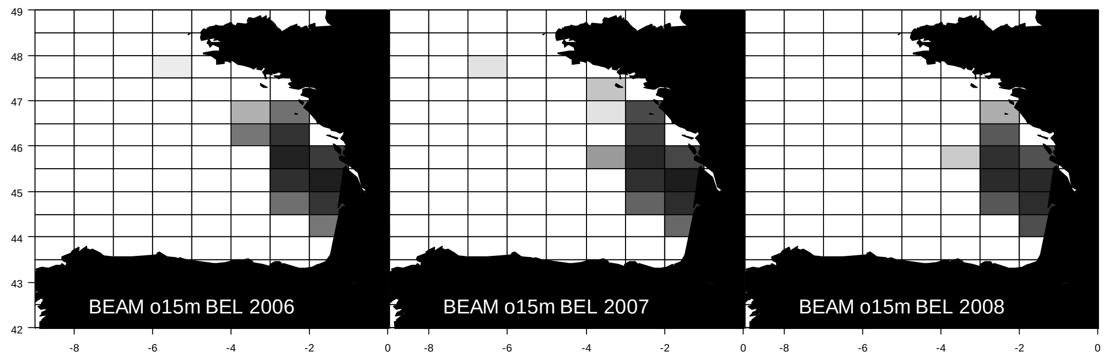


Figure 4.4.2 : Spatial effort distribution of over 15 m Belgian beam trawlers in the Bay of Biscay from 2006 to 2008

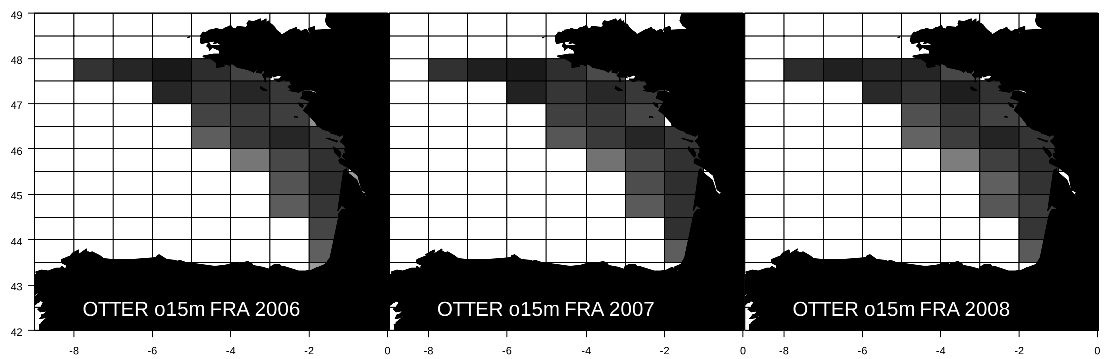


Figure 4.4.3 : Spatial effort distribution of the over 15m French ottertrawlers in the Bay of Biscay from 2006 to 2008

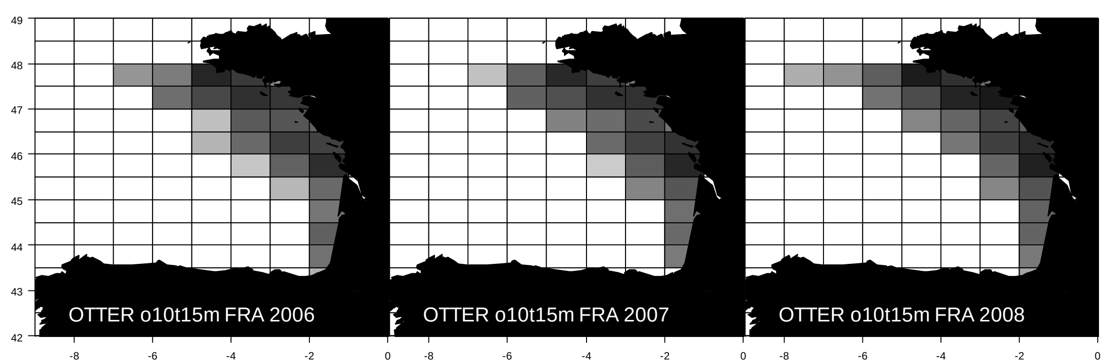


Figure 4.4.4 : Spatial effort distribution of the 10-15m French ottertrawlers in the Bay of Biscay from 2006 to 2008

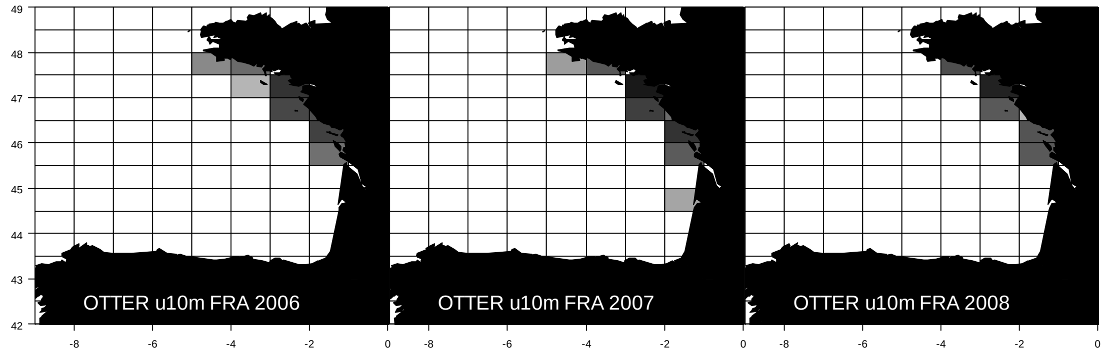


Figure 4.4.5 : Spatial effort distribution of the under 10m French ottertrawlers in the Bay of Biscay from 2006 to 2008

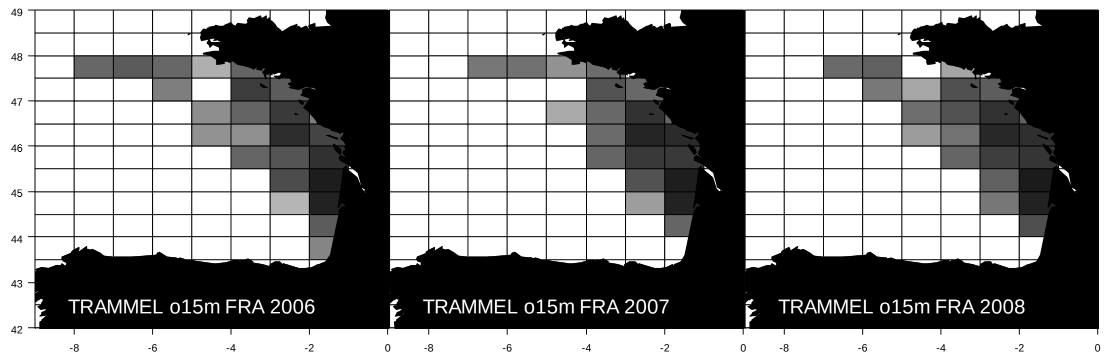


Figure 4.4.6 : Spatial effort distribution of the over10m fishing boats of the French trammel fleet in the Bay of Biscay from 2006 to 2008

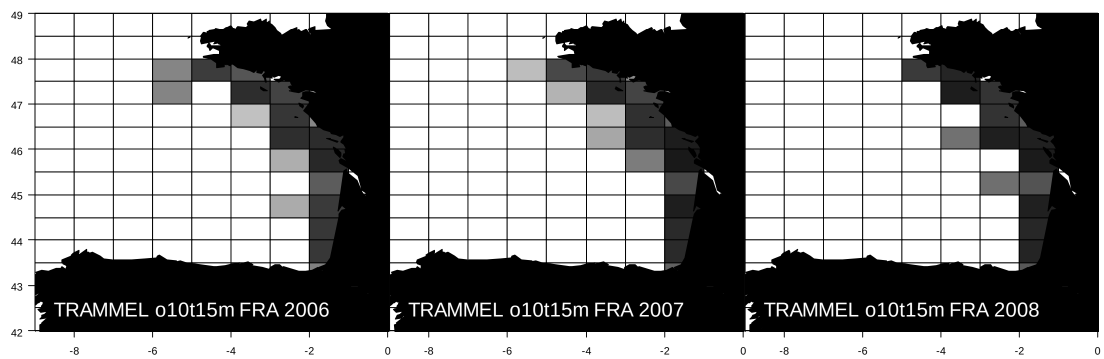


Figure 4.4.7 : Spatial effort distribution of the 10-15m fishing boats of the French trammel fleet in the Bay of Biscay from 2006 to 2008

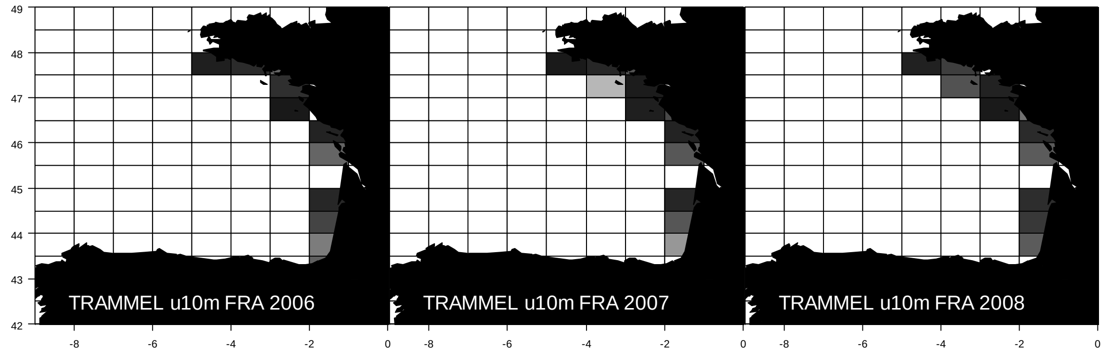


Figure 4.4.8 : Spatial effort distribution of the under 10m fishing boats of the French trammel fleet in the Bay of Biscay from 2006 to 2008

4.4.2. Evaluation of the effects of the multi-annual plan on the abundance of the stock

There has been overestimation of fishing mortality in recent years and, consequently, underestimation of spawning stock biomass (Figure 4.4.9). This bias limits the assessment of the effectiveness of the multi-annual plan in reducing fishing mortality. However, the increasing SSB trend over years has been observed even with this bias.

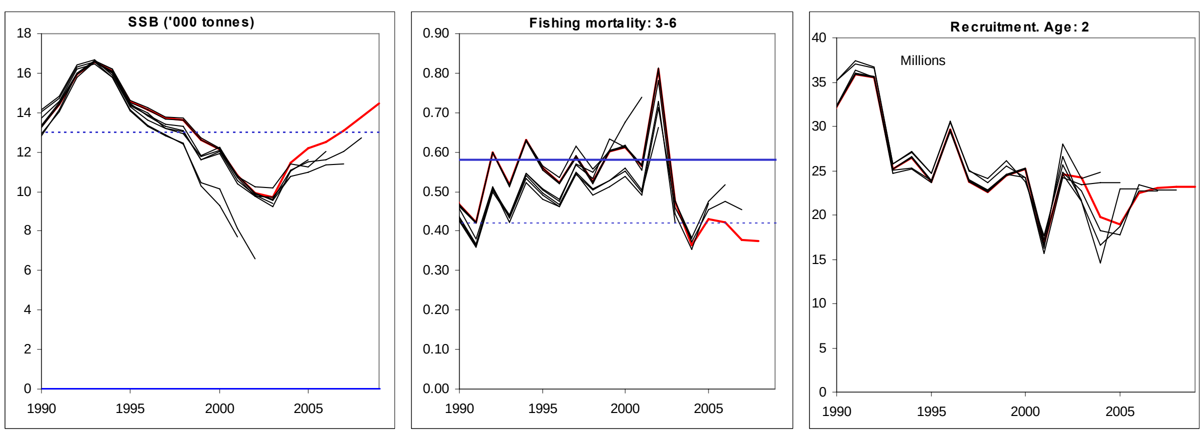


Figure 4.4.9 Comparison of 2009 Bay of Biscay assessment with previous assessments (predicted intermediate years are included).

4.4.3. Changes in spatial distribution of stock

Surveys of this stock have been carried out only since 2007 onwards and consequently the time-series is too short to give information on the change in spatial distribution of the stock since the multi-annual plan has been agreed.

4.4.4. Evaluation of the effects of the multi-annual plan on the ecosystem.

There is no information on the possible effect of the multi-annual plan on the ecosystem.

4.4.5. Biological sustainability of the plan to 2015

The potential candidates for F_{MSY} target fishing mortality are F_{max} (0.24) and $F_{0.1}$ (0.1). Both *F*max and $F_{0.1}$ imply an equilibrium SSB that is above the historic maximum of the time series. Under these circumstances currently F_{max} appears to be a more plausible F_{MSY} fishing mortality target.

Medium term projections using the package CS5 (used for the original Impact Assessment), assuming no implementation or measurement error are used to illustrate possible scenarios from 2010 to 2015 (Figure4.4.10-11). These projections assume recruitments at GM $_{93\text{-}06,}$ following same assumptions as ICES when carrying out forecasts for this stock. However ICES has underlined (ICES, 2009a) that variability of recruit series has increased since 2001 and that, in the recent period, the use of GM estimate has lead several times to forecasting an increase in SSB which was higher than the observed one in following years. The fishing mortality in 2009 is estimated to be at a status quo value (0.39) which implies a catch 11% higher than TAC in the short term predictions. In contrast, the retrospective pattern of fishing mortality shows a tendency to overestimate fishing mortality in recent years. There are consequently some uncertainties on the value of the fishing mortality in 2009. However, even if the present estimate of the fishing mortality in 2009 is overestimated, the annual 10% decreasing in fishing mortality set in the first step of the plan continued into the second step may bring the fishing mortality below F_{max} before 2015. This possible scenario corresponds to a decrease in landings to between 3700 and 4400t in 2013 and then an increase to about 5000t after 2020 if the fishing mortality is kept at *F*max (Figure 4.4.10). An alternative scenario to reach F_{max} before 2015 may be to set a fixed catch equal to 4200t or below, from 2011 to 2014 (assuming fishing mortality in 2010 is 10% below fishing mortality in 2009 as in the first scenario). For this second example scenario, the fishing mortality has been set to F_{max} after 2015 and therefore the catch in the long term are similar to those of the first scenario and stable at about 5000t after 2020 (Figure 4.4.11). Under this scenario *F* in 2015 is expected to be 0.24 ±10% assuming that the TAC (2010-2014) is taken without implementation error and that mean of the recruitments are at GM in forthcoming years. Extending the fixed TAC to 2015 will increase the spread of *F* values in that year.

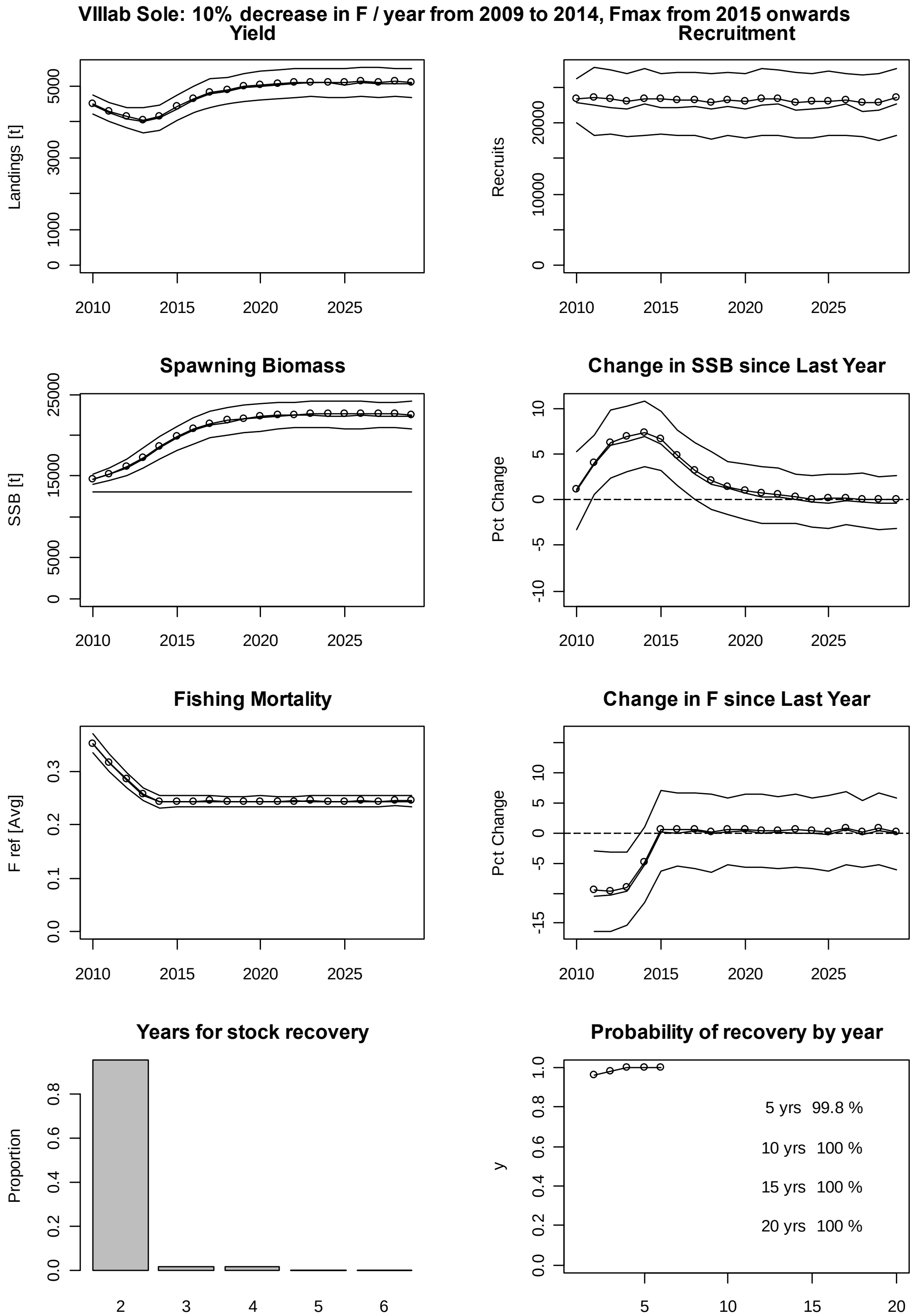


Figure 4.4.10 : Example of Bay of Biscay sole multi-annual management scenario to reach $F_{\max}$ in 2015 (using CS5 ; 10% reduction in fishing mortality until $F_{\max}$ is reached and constant F equal to $F_{\max}$ afterwards)

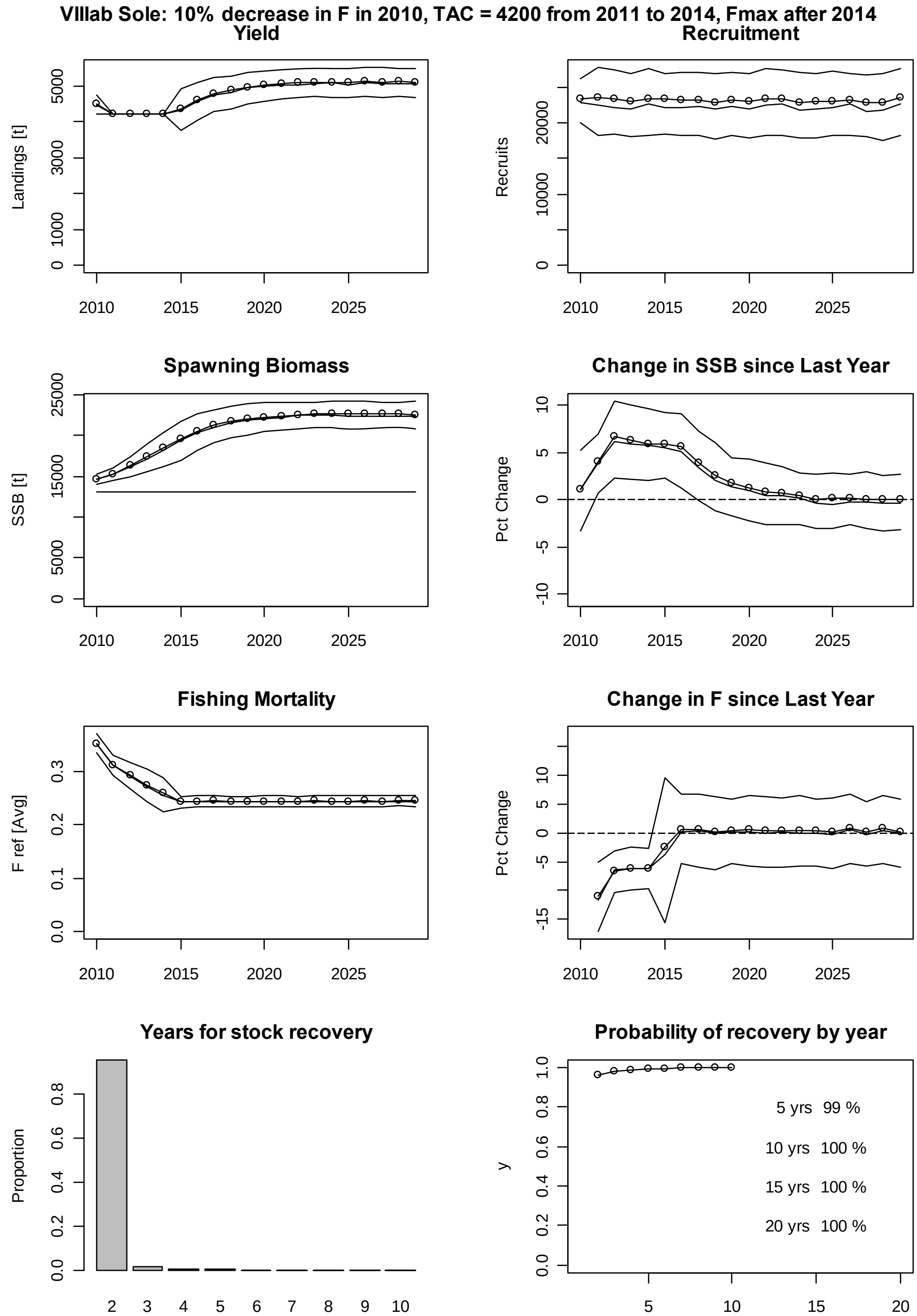


Figure 4.4.11 : Example of Bay of Biscay sole multi-annual management scenario with 50% probability to reach $F_{\max}$ in 2015 (using CS5 ; constant catch to reach Fmax in 2015 and constant F equal to $F_{\max}$ from 2016 onwards)

4.5. Social and Economic Effects of the Plan

Section 6.5.1 gives an overview of the economic aspects of multi-annual plans in general, it is located in the section dealing with the NS plaice and sole plan but should be read also with respect to the plan for Bay of Biscay sole.

The French fleet is the major participant in the Bay of Biscay sole fishery with landings being about 90% of the total official international landings over the historical series. Most of the remaining part is usually landed by the Belgian fleet. The fishery is largely a fixed net fishery directed on sole, particularly in the first quarter of the year. The other component is a French and Belgian trawl fishery. The French trawlers are otter trawlers with mixed species catches (sole, cuttlefish, squid, hake, pout, whiting….). The Belgium trawlers are beam trawlers directed at sole, but anglerfish is an important part of its catch. The French coastal boats of these two fisheries have a larger proportion of young fish in their catch than offshore boats. These boats less than 12 m long contribute to the landings by about one third from 2000 onwards. Sole is a major resource for all these boats, given the price of this species on the market. Although the species is taken throughout the year, the catch of coastal netters is less important in autumn, those of coastal trawlers in winter and those of offshore French boats are heaviest in the first quarter.

4.5.1. Data and Indicators

From the Annual Economic Report 2009 (STECF 2009a) data is available on the fleet segments at national level and not specifically on the vessel subgroups targeting sole in the Bay of Biscay. Basically three fleet segments are affected by the multi-annual plan: Beam trawler (TBB 24-40: Table 4.5.1) and two fleet segments using passive gear (DFN 0-12: Table 4.5.2 and DFN 12-24). Although the plan was first implemented in 2007 it was not possible to draw any conclusions from the economic data on the effects of the plan. There is insufficient disaggregation of the data to allow an assessment of the fisheries on stocks that form only part of the fishery of fleets. The three segments within the AER 2009 may harvest the sole stock in both VIIe and VIII but also includes vessels which are using the same gears without fishing for sole.

Data for the French segment DFN 12-24 show a huge difference in value of landings between 2006 and 2007 and because of the lack of local knowledge to explain that difference in the SGMOS, they were not used.

Both the other fleet segments had positive net profits in 2007 and showed a robust economic performance over the three years at national level (not exclusively vessels targeting sole).

No detailed information is available on changes in fleet behaviour such as fishing near shore to reduce fuel consumption, or changes of fishing gear in the recent years (2008-2009). The dynamics and profitability of the Bay of Biscay fleets have been described by Daurès et al. (2009), profitability shows increasing trends between 2006 and 2007 for Netters (Coastal and Non coastal vessels) decreasing trends for Coastal trawlers and stability for Non coastal trawlers. No data on the changes in exit (or entry), choice of gear, or change in range of activity beyond those presented for the period 2000-2007 (Daurès et al 2009) are available, consequently therefore it is not possible to show the effects of the Management Plan.

Table 4.5.1 Economic indicators by year (2005 to 2007) for Belgian Beam trawler fleet TBB24-40

	0	TBB 24-40		
mln	2005	2006	2007	3yr aver.
Euro				
Value of landings	0,980	0,820	0,3	0,7
Fuel costs	0,32	0,32	0,1	0,3
Other running costs	0,10	0,12	0,0	0,1
Vessel costs	0,03	0,05	0,0	0,0
Crew share	0,01	0,02	0,0	0,0
Gross cash flow	0,51	0,32	0,13	0,3
Depreciation	0,17	0,12	0,05	0,1
Interest	0,0	0,0	0,00	0,0
Net profit	0,34	0,20	0,08	0,2
Gross value added	0,52	0,34	0,13	0,3
Invested capital	1,4	1,1	0,4	1,0
Required cash flow	0,2	0,1	0,0	0,1
Break-even revenue	0,3	0,3	0,1	0,3

Table 4.5.2 Economic indicators by year (2005 to 2007) for French fixed gear fleet DFN 0-12

	0	DFN 0-12		
mln	2005	2006	2007	3yr aver.
Euro				
Value of landings	112,53	117,87	121,3	117,2
Fuel costs	6,4	7,38	8,0	7,3
Other running costs	26,0	29,3	28,9	28,1
Vessel costs	6,06	6,85	6,9	6,6
Crew share	51,84	54,05	55,6	53,8
Gross cash flow	22,2	20,3	21,9	21,5
Depreciation	9,9	11,65	13,2	11,6
Interest	0,0	0,0	0,0	0,0
Net profit	12,3	8,6	8,7	9,9
Gross value added	74,1	74,3	77,5	75,3
Invested capital	71	100,39		85,7
Required cash flow	9,9	11,7	13,2	11,6
Break-even revenue	50,2	67,7	73,3	63,3

4.5.2. *Economic sustainability of the plan*

The plan was first implemented in 2007 and for most of the fleet segments we had economic data only for 2007 without being able to disaggregate them to differentiate between fisheries. For a sufficient evaluation at least three years of data are necessary to may be able to identify trends (see Section 7.5). Therefore, the economists were not able to draw conclusions on the performance of the plan.

4.6. Added value of the multi-annual plan

This aspect was addressed by determining the different TACs that would have been set in the absence of the plan using Commission policy documents (EC 2006c, EC 2007c and EC 2008) to define the alternative rules (See Annex B for more details on the method). The effect of the different policy on the TACs set, the resulting SSB and where possible economic indicators is discussed below.

4.6.1. Benefits/losses to the fishery and to the stock that have resulted from the multi-annual plan.

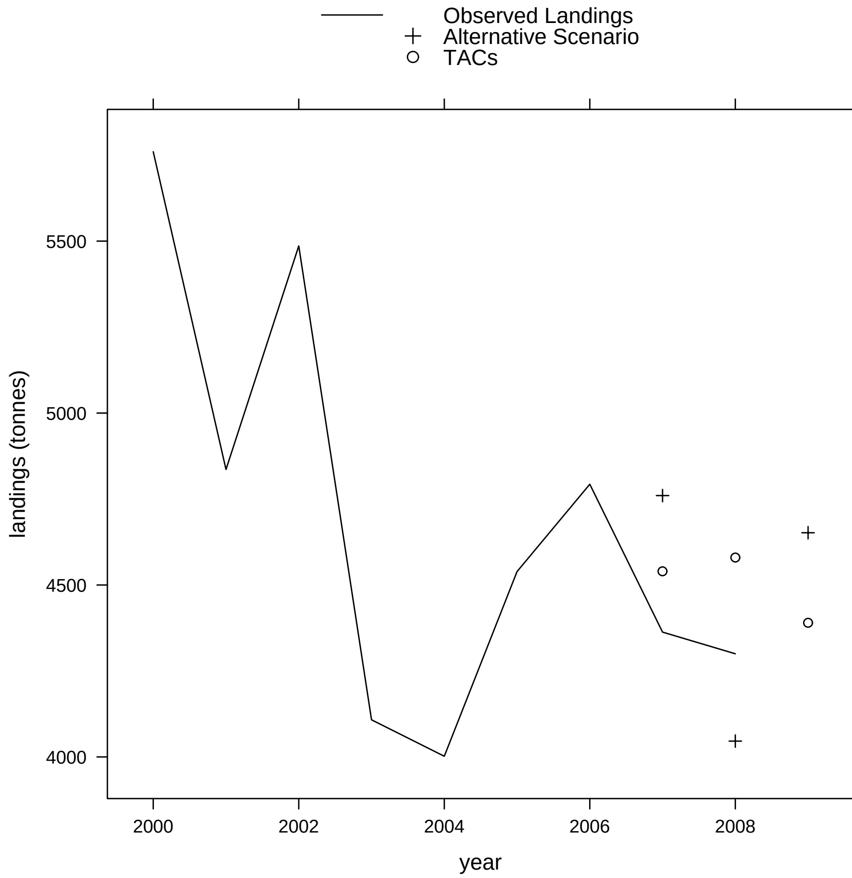
For Bay of Biscay Sole **a**lternative TACs that would have been applied in the absence of the multi-annual plan were determined using the approach described in Annex B using the following decision process.

The stock was outside of safe biological limits in 2006. According to the rules of the policy statement (EC 2006c) this would have led to a proposed TAC for 2007 that would have brought the stock inside safe biological limits in 2008, subject to a maximum TAC change of 15%. This would have resulted in a TAC in 2007 of 4 760 t (Figure 4.6.1).

To set the TAC for 2008 the Commissions policy document for 2007 (EC 2007c) was used as follows. The stock would still have been estimated outside of safe biological limits in 2007 as there is a marked retrospective pattern in estimates of fishing mortality and SSB for this stock. Estimates of SSB being successively revised upwards and estimates of fishing mortality revised downwards. The difference in terminal estimates of SSB for recent years from those of the 2009 assessment was just typically around 10%. A 10% SSB bias in the TAC estimation procedure was therefore applied in the simulation to take account of the assessment error. The reduction in landings perceived to have been required in 2008 in order to reach B_{PA} in 2009 would have been constrained by the 15% rule to a TAC value of 4 046 t in 2008 (Figure 4.6.1).

As consequence of the retrospective bias the stock would still have been perceived to have been outside safe biological limits in 2008. The same procedure as above would have been applied, although the 15% constraint would not have been needed, leading to TAC for 2009 of 4 652 t.

It was noted that in year before the plan an approximate 13% overshoot of the TAC had resulted although during the period of the multi-annual plan (2007 and 2008) the TAC had been undershot by 4% and 6% respectively. Consequently, given these low percentages, no correction for implementation error was applied in the simulations during 2007-2009.



Year	*Agreed TAC*	*Alternative Scenario TAC*
2007	4 540 t.	4 760 t.
2008	4580 t.	4 046 t.
2009	4 390 t.	4 652 t.

Figure 4.6.1 Bay of Biscay sole alternative scenario evaluation. Observed landings, as reported to ICES are shown for the period 2000 to 2008 along with the agreed TACs and alternative scenario TACs for 2008 and 2009.

Figure 4.6.1 shows the observed landings, the agreed TACs and the likely TACs that would have been applied in the absence of the multi-annual plan. In summary the absence of the plan TACs were likely to have had a similar average level but to have been more variable between years. In the absence of the plan the stock would not have reached safe biological limits until 2009, two years later than under the multi-annual plan.

4.6.2. Economic and social benefits/losses that have resulted from the multi-annual plan.

There is only national economic data for 2008 from Belgium and it was impossible to divide these data and the data on the French fleet segments between different fisheries. See also section 4.5.3.

4.7. SG-MOS Evaluation of the Performance of the Plan

4.7.1. Effectiveness

Achievement of objectives of the plan :- short term:

> In 2009 Bay of Biscay sole stock was estimated by ICES to be above B_{PA} (13 000) and exploited below F_{PA} (0.42). This is consistent with the objectives of stage 1 of the plan.
>
> In 2009 Bay of Biscay sole was estimated by ICES have been above B_{PA} for 2 years. This implies a requirement for a long term target, which is not explicitly defined in the plan.

Immediate impacts of the multi-annual plan on the environment and the ecosystem:

> No wider impact on the ecosystem has been identified. However, Bay of Biscay sole stock is now above B_{PA}.

Side effects resulting from the plan:

> Improved compliance with the TAC has probably had an affect of increased effort in other fisheries in the Bay of Biscay.

Influence on implementation of external factors such as global change, ecosystems effects, or other fisheries:

> Increases in the price of fuel have affected both the allocation of fishing effort and the profitability of the Belgian beam trawl fleet that fishes in the Bay of Biscay. However, this forms only a small part the fisheries for this fleet.

4.7.2. Utility

Trends in fleet capacity expected and observed:

> Decommissioning in the French fleet may have occurred in response to the multi-annual plan. The decommissioning scheme has specific different prioritising criteria for vessels which participate in multi-annual plan fisheries, from those vessels that do not. The changing fishing opportunities resulting from the plan may have affected uptake of the decommissioning scheme.

Capacity of fleets affected by the multi-annual plan:

It has not been possible to make economic evaluations, involving capacity, for the period of the plan due to a lack of economic data so soon after the start of the plan.

Contribution of the multi-annual plan contribute to adapting the fleet capacity to the fishing possibilities resulting from the multi-annual plan:

Some reductions in capacity can be attributable to the plan for fleets that fish for sole in this area.

4.7.3. Efficiency (cost-effectiveness)

Costs of this plan (eg employment, gross revenue of the fleet):

It has not been possible to make economic evaluations for the period of the plan due to a lack of economic data so soon after the start of the plan. See also section 4.5.3

Economic benefit/loss during the period of implementation:

There were no detectable changes in the economic performance of fleets for which preliminary data for 2008 were available. See also section 4.5.3

4.7.4. Indicators

In the absence of sufficient time-series of observation it has not been possible to evaluate the utility of the indicators selected.

However, in addition to those in the template (Annex A) It is useful to consider extra indicators for economic and social performance of the multi-annual plans.

- market prices for sole
- comparison of salaries in fisheries to salaries in other primary sectors and national average salaries

Market prices as indicators were already discussed in the Impact Assessment for the North Sea sole and plaice plan (STECF 2006 ch. 9). For sole the market is quite small and changes in one fishery may affect prices more deeply than for plaice, where the market is larger. The following text table includes ex-vessel prices for sole comparing the prices in the main regions in France with the overall price level.

	2007	2008	2009
Sole Bay of Biscay	€/kg	€/kg	€/kg
Main French Ports	13.4	11.7	n.a.
Overall	11.4	10.5	9

It was not possible to draw conclusions from the market prices because it was unclear if this is a separate market. In case of a separate market changes in landings may be the reason for changes in prices.

4.7.5. Sustainability

From the experience so far it is not possible to draw conclusions about the sustainability of the plan.

4.8. SG-MOS Conclusions for Bay of Biscay sole plan

Based on the information above the subgroups overall judgement on the plan is provided below.

Regarding the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy.

There are explicit tactical rules for transition to safe biological limits which is the first objective of the plan, these rules make the implementation of change more predictable for participants.

In practice the TACs that have been set under the multi-annual plan are thought to have been much less variable than would have been set under the Commissions TACs policy document relating to 2007-2009 (EC 2006c, EC 2008c, EC 2008) even though the average would have been similar.

Regarding the success of the plan in achieving its stated objectives

The stock of Bay of Biscay sole is now estimated to be inside safe biological limits, the objective of stage 1 of the plan. It is thought that in the absence of the plan the stock would not have reached safe biological limits until 2009, two years later than under the multi-annual plan.

Medium term simulations indicate that reducing target F in steps of 10% from 2009 will result in reaching a target fishing mortality of F_{max} in 2014.

An alternative fixed TAC strategy (TAC=4 200) would deliver a similar result with a 50% probability conditional on full compliance and recruitment similar that that observed in the past.

Regarding the most important elements of the plan that would influence achievement of its objectives.

> Targets for exploitation are preferable to biomass targets to achieve biological sustainability. Long term targets combined with annual rules provide a useful basis for annual decision making on exploitation rates. Constraints on annual change in TAC are expected to be important for obtaining economic stability. This is expected also to improve acceptability to policy makers and stakeholders and therefore implementation.

Regarding specific indicators that would be useful for a future evaluation of this multi-annual plan

> It seems that the indicators currently proposed do not provide sufficiently for some aspects that are important to some stakeholders such as the RACs. There is a need to consult with the stakeholders to see if some additional indicators are necessary and if so identify with them the provision of the necessary data.

Regarding additional data that should be collected in the future to help in evaluating the multi-annual plan.

> Additional data suggestions are given below in section 7.5.4

Regarding links that should be made between this and other plans.

> Plans should be fishery based, however, this sole fishery is rather independent of fisheries covered by other plans.

Regarding elements of the plan that require revision

> A clause concerning what to do if the assessment is nolonger accepted is required.

> Long term plans need to be considered over a number of years. The minimum period that should be considered for routine evaluation is 3 years after implementation. The timing of evaluations of plans needs to be linked to the availability of data. For example 3 years of biological data become available at approximately month 48 and 3 years of economic data at approximately month 60. Thus a full 3 year evaluation cannot be conducted until 5 years from the commencement of the plan.

> Currently there is no long term target for stage 2 of this multi-annual plan. As multi-annual management is now expected to be carried out under stage 2 there is an urgent need to select an appropriate target. F_{max} appears to be a plausible F_{MSY} fishing mortality target.

5. TOR 2. REVIEW OF MULTI-ANNUAL PLAN FOR SOLE IN THE WESTERN CHANNEL R(EC) NO 209/2007

5.1. Background.

5.1.1. Background information

In 2003 ICES and STECF advised no fishing on this stock unless a recovery plan was in place. The Commission proposed such a recovery plan (also including the Bay of Biscay sole) in 2003 (EC 2003) following response from the European Parliament (EC 2005b), The Council established a multi-annual plan for the exploitation of the stock of sole in the Western Channel in 2007 (Appendix II, EC 2007a). However, effort management was introduced in 2005, which can be taken as effective date of implementation.

5.1.2. Overall objectives of the plan

The objective of the plan (Appendix II) is to

> "ensure the sustainable exploitation of the Western Channel sole stock.
>
> This objective shall be attained by achieving and maintaining fishing mortality at a rate of 0,27 on appropriate age groups."

There are no changes to the first legal text. The main reference point for the plan is a fishing mortality rate of 0.27. No additional considerations have been taken since the implementation of the plan and the plan remains species specific.

The plan states that the rate of progress towards the targets of the multi-annual plan should be evaluated in 2009 and in each third successive year.

5.1.3. Annual *F* and TAC targets set during the period of implementation

Catch estimates have fluctuated between 800 t and 1000 t since the early 1990s, whereas TACs have varied from approximately 300 t to 1000 t over the same period (ICES 2009b). There is no indication that the international uptake of the TAC for the stock has been influenced by the TACs set according to the Flatfish multi-annual since 2007. A history of annual *F* and TAC targets can be found in the advice from ICES (ICES 2009b). The plan has followed the TAC and effort rules laid down in articles 4 and 5 of Regulation (EC) No 509/2007. Days-at-sea limitations were established each year since 2005 as follows for vessels over 10m and present in zone VIIe:

Year	Days-at-sea for beam trawlers over 80mm mesh	Days-at-sea for static nets under 220mm mesh
2005	240	240(*)
2006	216	216
2007	192	192
2008	192	192
2009	192	192

(*) In 2005 the restriction covered all mesh sizes.

5.2. Design Issues

A number of issues with the implementation have come to light.

1) Calculation of the TAC in 2010: in the agreed multi-annual plan is complex, since as written this uses *F* in 2009 not just to calculate the catch (from an assumed *F*2009) in the intermediate year, but also as part of a three year average for the calculation of 2010. Current procedures for the intermediate year use $F_{\text{status quo}}$ based on a 3 year average (2006-2008). Thus the 3 year average for the plan (F2010) becomes a complex weighted average of *F* in the last three assessment years, probably not what was really intended. A more straightforward use of the last assessed years might be clearer and less prone to intermediate year assumptions. However, if the objective is to obtain a transition phase with changing *F* some thought needs to be given to correctly including the required change from the assessment year through to the TAC year.

Also calculation method for TACs in 2011 and 2012 is perhaps implied but not defined precisely as the agreement requires the use of the following procedure which only works for 2010:

“that TAC whose application will result in a 15 % reduction in the fishing mortality rate in 2010 compared to the average fishing mortality in the years 2007, 2008 and 2009 as most recently estimated by STECF.”

2) The assessment has had a retrospective pattern, making the implementation of the multi-annual plan difficult because estimates of $F_{03\text{-}05}$ change each year and the final years *F* has been a substantial overestimate of the true *F* in the final year. The original idea behind the implementation of the plan was to reduce *F* in triennial steps in order to reduce the size of fluctuations in TAC, however practically the implementation has

meant a yearly 15% reduction in TAC not dissimilar to implementation of TACs in the absence of a multi-annual plan.

3) The multi-annual plan could theoretically lead to recommending increases in *F* for the second stage of the multi-annual plan over the first stage, out of line with the objectives of the plan. This is because poor compliance prior to 2009 has meant that landings were higher than the TAC. Because the TACs for the period 2010-2012 are based on the average *F*2007-2009 achieved this effectively delays the start of the *F* reduction in the multi-annual plan.

4) Currently there is no agreed analytical assessment on which the multi-annual plan calculations can be based. As the plan does not have a clause describing how to set a TAC in the absence of quantitative assessment, currently its not possible to use the plan to set a TAC.

5.2.1.1. Updates in the light of new information

In 2009 ICES (2009d) rejected the assessment as not fit for the provision of advice, and removed reference points despite the fact that these were based on historic trends in SSB unaffected by the retrospective pattern. STECF considers that it should be possible to develop suitable reference points based on historic trends.

5.2.1.2. Imbalances in the TAC levels for the other stocks concerned.

Only sole are covered by this multi-annual plan, but multispecies (sole and plaice) evaluations have been carried out by ICES in 2006. The current multi-annual target values for sole are consistent with prospective multi-annual targets for plaice a significant bycatch species.

5.2.1.3. Overlaps with other plans.

Implementation of the effort aspect of the plan depends on gear and area based days at sea allocations. While the total days allocated relates 'correctly' to the allocations by gear and by area national enforcement of days at sea is currently not required at area level. So at the moment days in VII d,f,g,h,j,k do not count towards that total for beam trawlers so effort allocation for vessels with multiple area licences could be used inappropriately in areas with effort restrictions. This aspect is nor solved even though single area licences to restrict area misreporting of catches are applied as the carrying of a licence is not linked to days present in an area. This issue was more problematic when beam trawler restrictions applied also to the eastern channel as part of the cod recovery plan.

With the implementation of the single area licensing in the western channel the beam trawl fleet may seek to fish in the North Sea so that clarification of this issue is important. French otter trawlers are not effort restricted and French inshore netters are unlikely to fish in other areas due to their small size.

There are currently no other known overlaps with other multi-annual plans.

There are a number of general considerations regarding the effects of errors in the assessments and projections, comments on this topic are included in Section 7.4.

5.3. Enforcement and Compliance

5.3.1.1. The level of compliance achieved

Compliance with TACs for Western Channel sole has historically been poor. UK beamtrawlers had used the opportunity to area misreport catches to two rectangles in area VIId. These landings have been identified by ICES (ICES 2002) in 2002 and included in the assessment for the period 1989-2002. For subsequent years this WG and its successor WGCSE have adopted the same procedure. France's official landings statistics for this stock have also been seen to be unreliable and recent WGs have used sales notes information for landings from 2002 onwards to correct for underestimation in the official landings statistics. These issues have continued since the implementation of the multi-annual plan in 2007, until at the end of 2008 the UK issued a single area license scheme which from 2009 onwards will make it more difficult for UK beam trawlers to area misreport.

Enforcement efforts have increased considerably in the UK fleet, but because of the proximity of the main fishery to the adjacent division, enforcement has been less than fully effective. The new single area license agreement in 2009 has greatly improved the effectiveness of enforcement. However it is also likely increased the incentives for underreporting. Currently, there is no quantitative information available on possible underreporting in the UK fleet, but resulting biases are thought to be small compared to previous values of area misreporting.

Information from the Commission indicates that in 2008 only one inspection was carried out. No analysis is possible.

5.4. Environmental Effects of the Plan

5.4.1. Evaluation of the effects of the multi-annual plan on the fishery

5.4.1.1. Changes in total TACs, catches, discards, landings fishing mortality and effort

ICES provides the history of landings (ICES 2009b) both as reported and as estimated for assessment purposes by WGCSE, (Table 5.4.1).

The basis for the evaluations of catch and effort was the database of catches and effort submitted to STECF by Member States under the 2009 data call issued 16 March 2009 (Corrigendum 19 March 2009) and compiled by the STECF-SGMOS-09-05 WG held in September, 2008 (STECF 2009b).

Annual reported landings and effort by vessel gear groupings were summarized for the period 2000-2008 for effort and 2002-2008 for landings in an attempt to identify trends that may have arisen as a result of the management plan.

The fleets exploiting sole and plaice in the Western Channel also catch anglerfish and to a much lesser extent hake. For this reason, catches of anglerfish, hake, plaice and sole for such fleets were also summarized. For Western English Channel it should be noted that discard information is very sparse and therefore any conclusions are based only on available landings information provided by member states to STECF-SGMOS-09-05 (STECF 2009b).

Table 5.4.1 Sole in Division VIIe (Western Channel). Single stock exploitation boundaries (advice), management, and landings/catch (taken from ICES (2009b)).

Year	ICES Advice	Predicted catch corresp. to advice	Agreed TAC	Official Landings	ICES Catch
1987	No increase in *F*	1.15	1.15	1.11	1.28
1988	No decrease in SSB; TAC	1.3	1.3	0.95	1.44
1989	No decrease in SSB; TAC	1	1	0.8	1.39
1990	SSB = 3000 t; TAC	0.9	0.9	0.75	1.31
1991	TAC	0.54	0.8	0.84	0.85
1992	70% of *F*(90)	0.77	0.8	0.77	0.89
1993	35% reduction in *F*	0.7	0.9	0.79	0.9
1994	No increase in *F*	1	1	0.84	0.8
1995	No increase in *F*	0.86	0.95	0.88	0.86
1996	F96 < *F*94	0.68	0.7	0.74	0.83
1997	No increase in *F*	0.69	0.75	0.86	0.95
1998	No increase in *F*	0.67	0.67	0.77	0.88
1999	Reduce F below F_{PA}	0.67	0.7	0.66	0.96
2000	Reduce F below F_{PA}	< 0.64	0.64	0.66	0.92[1]
2001	Reduce F below F_{PA}	<0.58	0.6	0.65	1.07
2002	Reduce F below F_{PA}	<0.45	0.53	0.54	1.11
2003	Rebuilding plan or *F*=0	-	0.39	0.62	1.08
2004	*F*=0 or recovery plan 1	0	0.3	0.49	1.08
2005	80% reduction in *F* or recovery plan	<0.23	0.865	0.96	1.04
2006	80% reduction in *F* or recovery plan	<0.24	0.94	0.97	1.02
2007	68% reduction in *F* or recovery plan	<0.35	0.9	0.82	1.02[1]
2008	75% reduction in *F*	<0.26	0.765	0.67	0.90[2]
2009	70% reduction in *F*	<0.32	0.65		
2010	Reduce fishing effort and catches	-			

Weights in '000 t. [1)] Revisions by WGCSE 2009. [2)] Preliminary.

Trends in reported effort by vessel gear grouping by country as well as corresponding trends in landings of main catch species (anglerfish, hake, plaice and sole) in the Western Channel are shown in Annex C, Tables C.1-3. It should be noted that the nominal effort of the 2 regulated gears (3a = beam trawl fleets and 3b = static nets) in the Western Channel only accounts for about 18% of all gears operational in that area.

The effort of the beam trawl fleets increased to 29% above the 2002 level in 2004 and stayed around 25% until 2007. In 2008 it dropped to 10% above the 2002 level. The static nets increased steadily over the time series to about 15% above the 2002 level in the years 2003-2005. Since then this category dropped sharply to 29% under the 2002 level in 2006. In 2007 and 2008 the effort dropped further down to 54% and 35% respectively under the 2002 level. However, the non-regulated otter trawl fleets under the sole management plan accounts for about 62% of the overall effort deployed in area VIIe (STECF 2009b). Effort from these fleets has decreased in the last 3 years to about 60% of its highest value in 2005.

The landings of the beam trawl fleets (derogation 3a of the TAC and Quota Regulation 2009: EU 2009) of anglerfish and sole have substantially increased in the last 4 years. Plaice landings have declined over the whole period where the landings of the other main species have been rather stable. Landings by static nets (derogations 3b: EU 2009) are dominated by anglerfish which show a sharp decline in the last 4 years.

Again, it should be noted that the sole landings of the unregulated otter trawl fleets are in excess of 27% of the overall sole landings in area VIIe for each year of the data series (2003-2008). For plaice percentages in excess of 22% are observed for each year of the time series (STECF 2009b). No particular trends in landings could be observed for the main species anglerfish, sole and plaice for this gear.

Overall hake forms only a small part of the catch for most of these fleets (Tables C.2 and C.3).

5.4.1.2. Changes spatial distribution of the fishery

International effort data for 2006-08 in the form of days at sea by gear is shown below (Figure 5.4.1-6) for the major contributors to landings in order of contribution of sole based on the effort database prepared by SG-MOS 09-03.

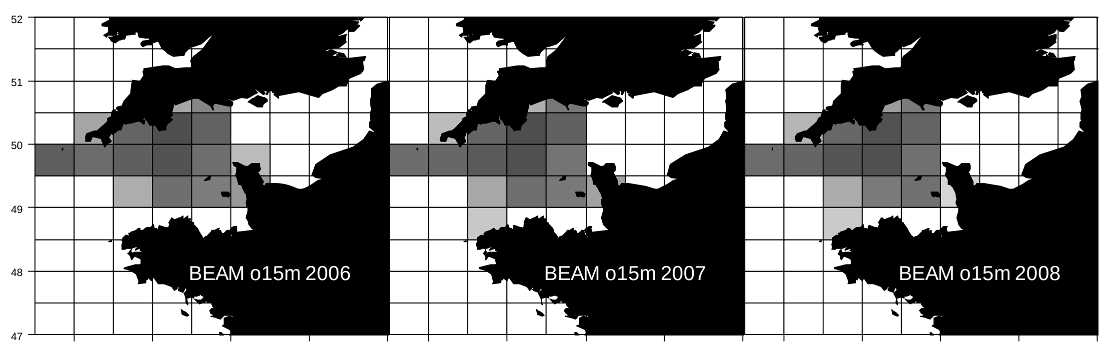


Figure 5.4.1 : Spatial effort distribution of the over 15m Beam Trawlers from 2006 to 2008

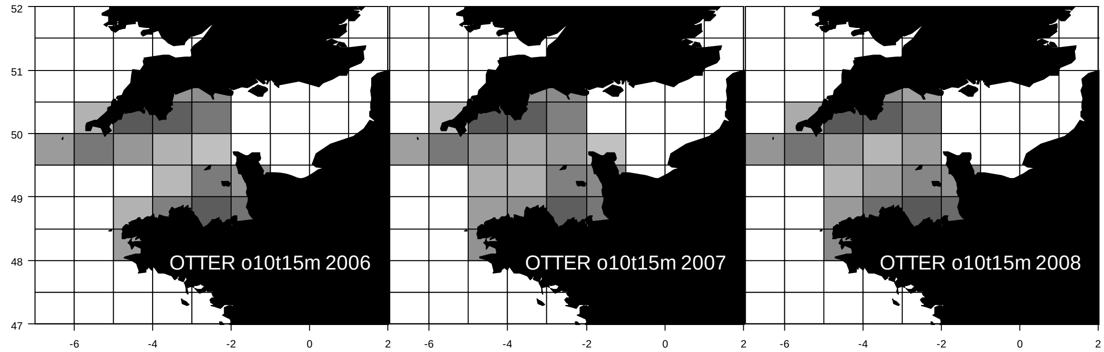


Figure 5.4.2 : Spatial effort distribution of the 10 to 15m Otter Trawlers from 2006 to 2008

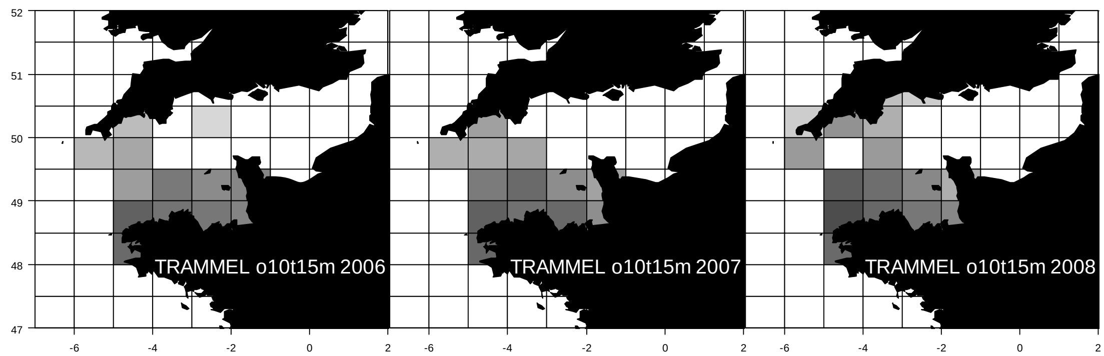


Figure 5.4.3 : Spatial effort distribution of the 10 to 15m Trammel Netters from 2006 to 2008

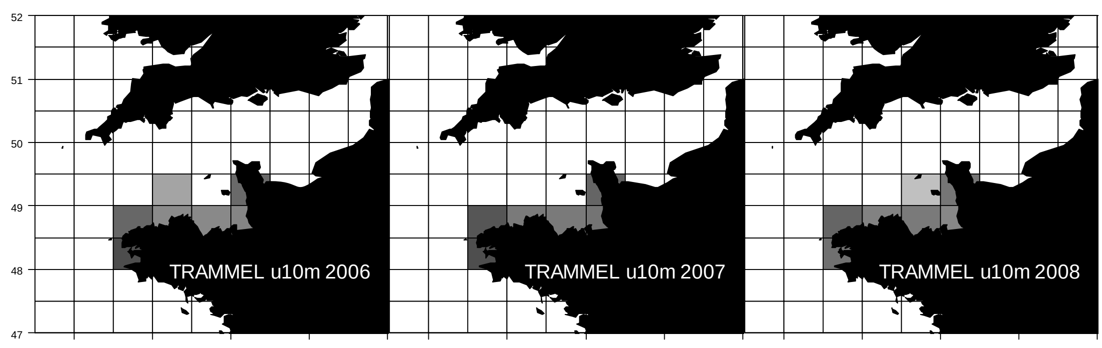


Figure 5.4.4 : Spatial effort distribution of the under 10m Trammel Netters from 2006 to 2008

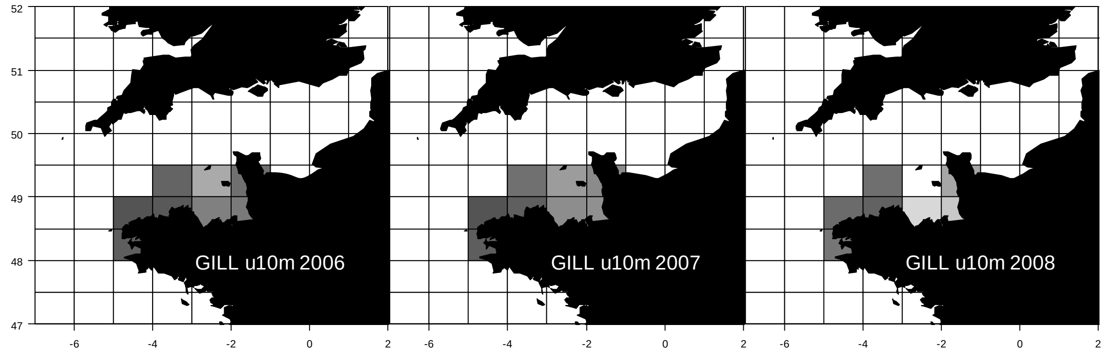


Figure 5.4.5 : Spatial effort distribution of the under 10m Gill Netters from 2006 to 2008

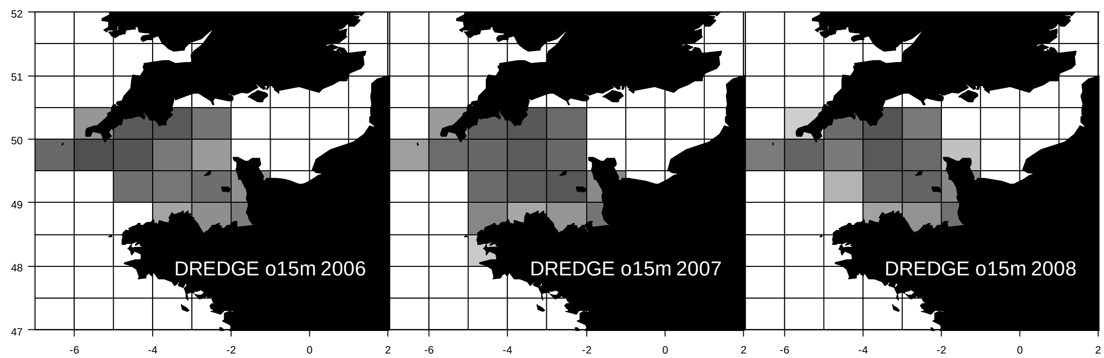


Figure 5.4.6 : Spatial effort distribution of the under 15m Dredgers from 2006 to 2008

From these figures there is little evidence of a change in the spatial distribution of the fisheries exploiting sole. However, as few of these fisheries rely on sole catches through out the entire year, so the annual scale of the data may mask some responses to the multi-annual plan.

5.4.2. Evaluation of the effects of the multi-annual plan on the stock

5.4.2.1. Changes in stock (SSB)

Unfortunately ICES has not provided an assessment for 2009 because WKFLAT09 deemed the assessment to be unsuitable for management because of the retrospective pattern in *F* and SSB (Figure 5.4.7.)

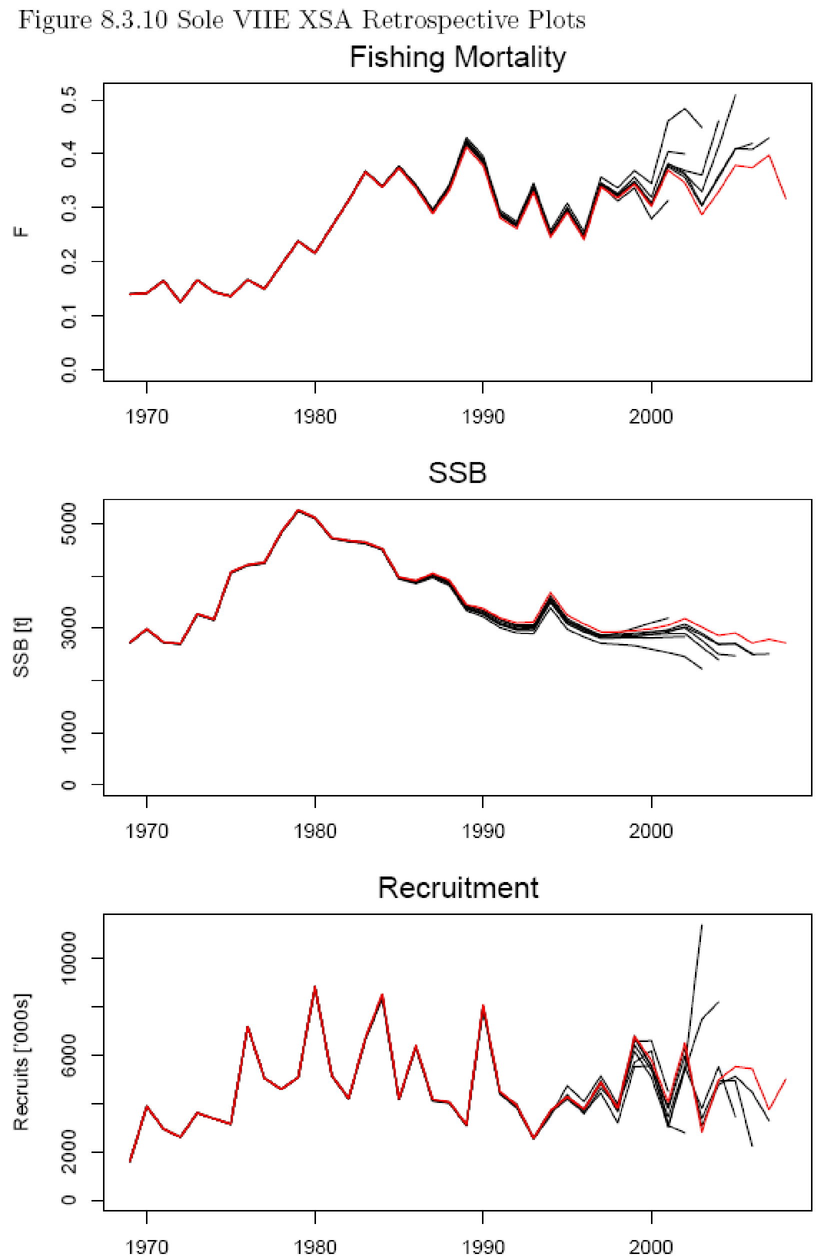


Figure 5.4.7 Experimental assessment and analytic retrospective pattern (ICES 2009d)

This experimental assessment indicates that *F* in 2008 was 0.37 and given the retrospective pattern it is likely to have been a significant over estimate. Nevertheless in a relative sense it indicates a decline in *F* compared to previous final year.

In the absence of a quantitative assessment of the stock dynamics of western channel sole the ability to address this TOR is relatively limited. However, one avenue open to STECF is the investigation of *F* is the survey data. Though noisy, particularly at the older ages the survey can be used to estimate relative changes in total mortality, or *F* assuming constant M. Figure 5.4.8 shows the mean standardised trends from the survey and assessment and the difference between the two. The overall trend in the difference implies that historically the survey overestimates Z compared to the assessment, however the trend in recent years is for the assessment to strongly overestimate mortality.

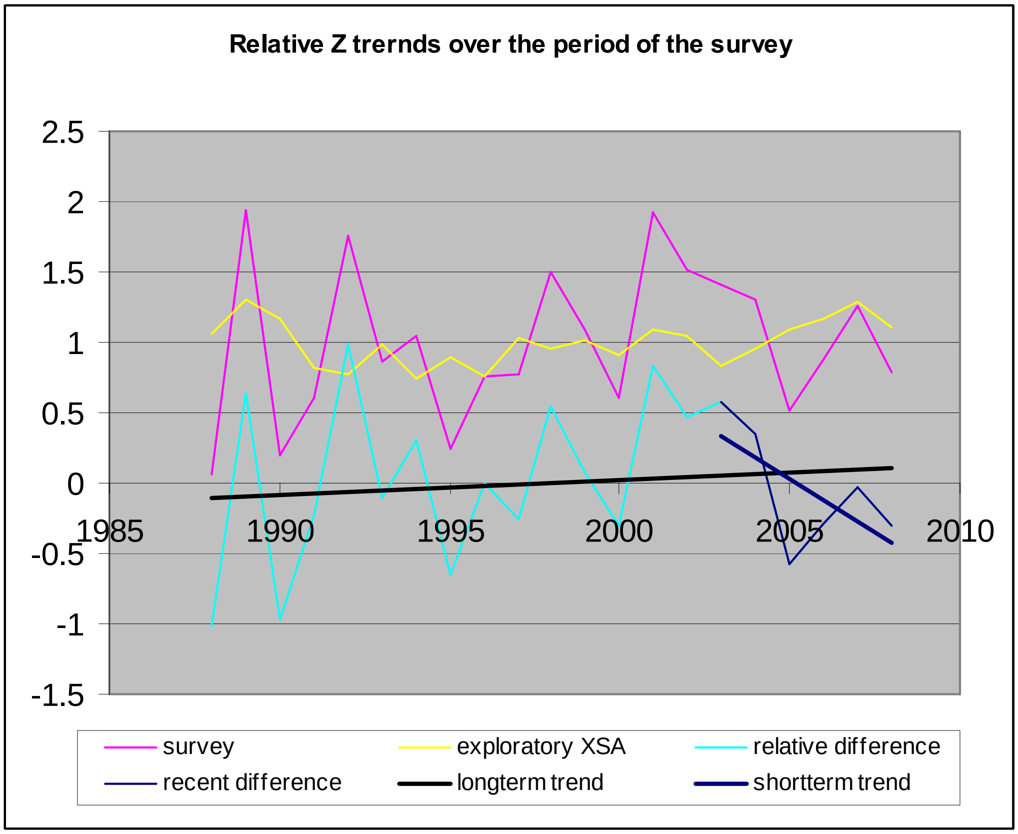


Figure 5.4.8 the mean standardised trends in Z for W C sole from the survey and experimental assessment and the difference between the two.

Figure 5.4.9 indicates the survey estimates of Z for ages 2-6 the main portion of the fishery. Also included in the plot is the overall trend in *F* over these ages from 2003-2008 indicating a decline of about 5% in *F*. The precision of the analysis is low, but it does not show that *F* is rapidly increasing in recent years as suggested by ICES advice.

Plotted also is the GRT corrected effort series of the UK beamtrawl fleet, mean standardized, indicating that their effort has also decreased marginally over the same period. This fleet takes the majority of catches in this fishery and as such should have a major influence on the trends in *F*.

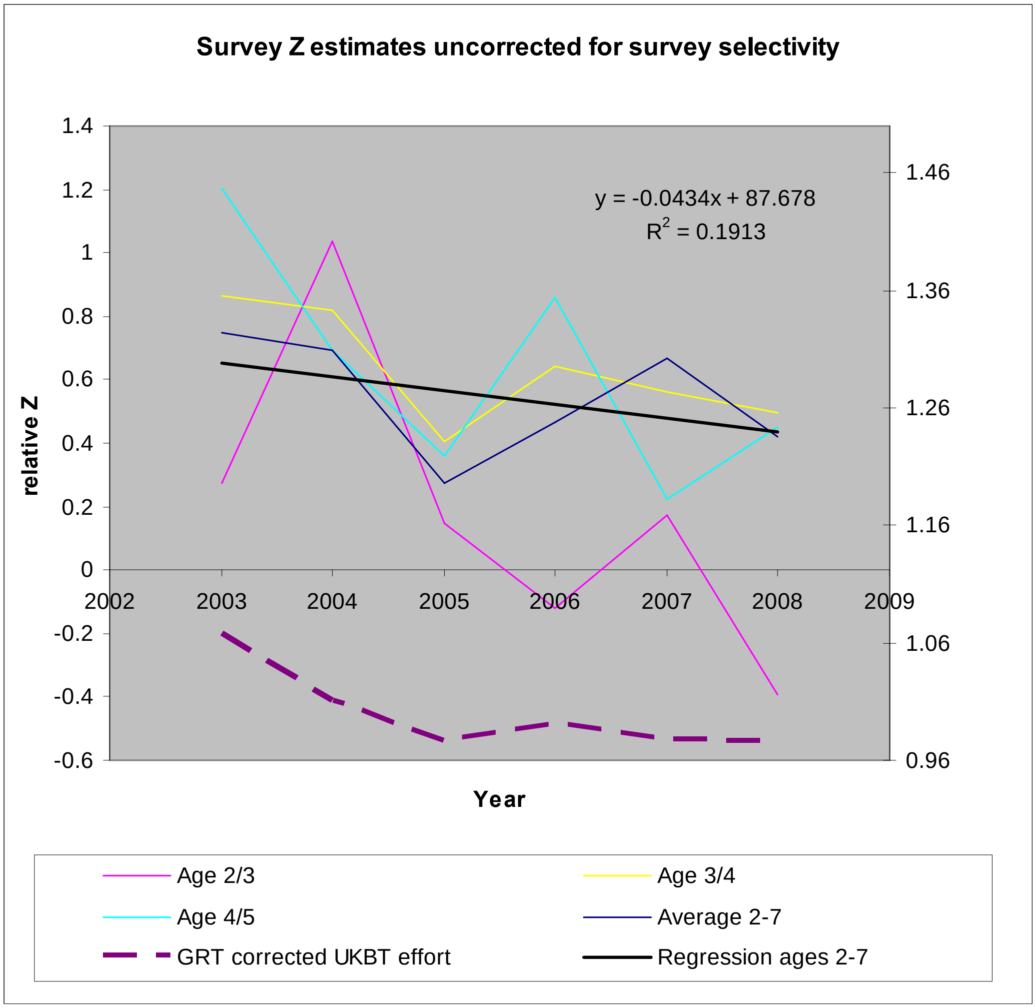


Figure 5.4.9 Survey estimates of Z for W C sole ages 2-6 the main portion of the fishery, trend in *F* over these ages from 2003-2008 indicating a decline of about 5% in *F*.

5.4.3. Changes in spatial distribution of Western Channel sole stock

5.4.3.1. Introduction

In the framework of the European project FISBOAT (Fisheries Independent Survey Based Operational Assessment Tools, DG–Fish, 6th Framework STREP, Contract 502572), monitoring procedures based on indicators have been developed. They are adapted for single-species stock assessments and management strategies using fishery-independent information from research surveys. The spatial analysis applied on the Western Channel sole survey uses part of this methodology, in order to detect potential changes in the spatial distribution of the stock.

In brief, a multivariate approach is used to summarise the time series of the stock spatial distribution using spatial indices. The multivariate spatial index is interpreted by selecting those raw indices that best express the multivariate structure as well as have the smoothest time series. The multivariate evolution of stock spatial distribution is then monitored using a statistical process control scheme (decision interval CUSUM) which triggers alarms of deviation from a reference status with set statistical risks of false alarm and no alarm.

5.4.3.2. Survey Data

Data considered for the spatial analysis of the sole stock, were collected during 16 beam trawl surveys (BTS) carried out by several different vessels in the 4rd quarter of the years 1993 to 2008 in the Western Channel, ICES division IVe.

The study area was between 49.66°N and 50.64°N, between 3.98°W and 2.19°E, and the depth ranged from 4 to 81 m. Sampling was stratified according to ICES rectangles with fixed station positions, and the number of hauls per survey varied between 49 and 51. In this study we considered the data only inside a polygon (Figure 5.4.10) defined according to the number of times the ICES rectangles are surveyed per year along the time series. The polygon can be understood to be the core sampled area.

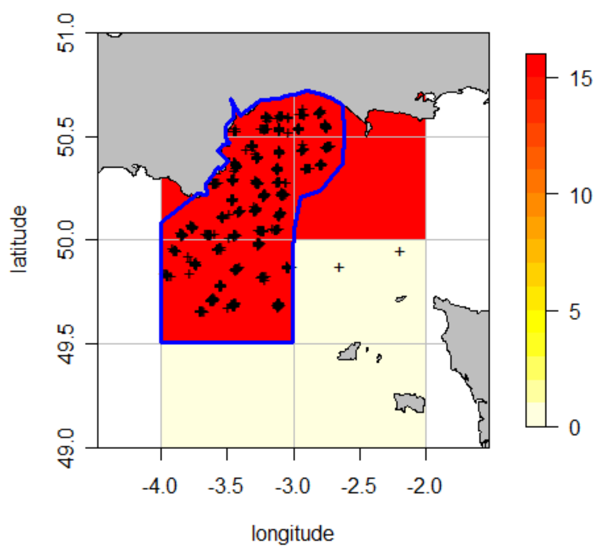


Figure 5.4.10 Map of all survey stations (+) during the W C sole surveys carried out from 1993 to 2008. The blue bold line is the boundaries of the sampled population defined according to the sampling intensity through the 16 surveys considered in the analysis.

Twin steel 4m-beam trawl was used with chain mat and single flip-up rope, and 80mm trawl with 40mm codend cover. From 2006, a SAIV mini CTD has been attached to one beam. Haul duration was on average 30 min at a towing speed of 4 knots, mainly in daylight. Catch numbers and age were recorded for sole (*Solea vulgaris*). For each station, densities were disaggregated by age and expressed in numbers of fish caught per hour trawled. To compute the spatial indices, we assumed that the swept area per hour of trawling was 0.009 nm^2/hour. and densities at age were expressed in numbers per square nautical miles. Age group 1 to 7 were considered for the analysis. Changes in the spatial distribution of the Western Channel sole stock over time can be firstly examined by plotting densities by age group and year. Figure 5.4.11 shows sole densities for age 2 for the last 6 years of the time series (2003-2008).

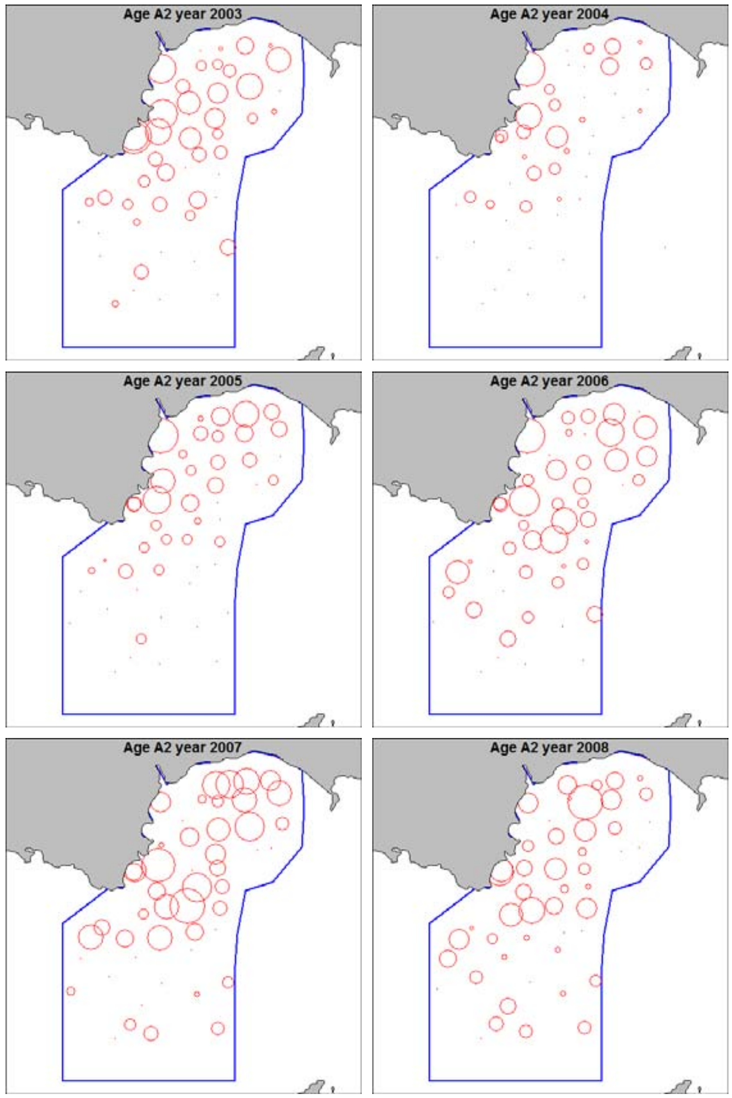


Figure 5.4.11 Bubble plots of sole aged 2 densities (N/nm²) found during the beam trawl surveys in 2003-2008. Bubble radius represents the square root of the density scaled to the maximum density of each map (i.e. each year and age). The bold line delineates the polygonal domain inside of which data have been considered through the 16 surveys.

5.4.3.3. Spatial indices

Selected statistics are chosen to capture spatial patterns of fish populations using fish density data collected during research surveys (Woillez et al., 2007). To handle diffuse population limits, indices are designed not to depend on arbitrary delineation of the domain. They characterize the location (centre of gravity), occupation of space (inertia, isotropy, positive area, spreading area and equivalent area) and microstructure (Table 5.4.2 and Annex B2). These spatial indices have the potential to be used in a monitoring system to detect changes in spatial distribution (Woillez et al., 2009a).

Input parameters

Spatial indices were calculated using R functions developed at Mines-ParisTech, Géosciences, Centre de Géostatistique. Some of the functions need input parameters which are given below:

(1) Definition of domain: To obtain a series of indices reliable over years, we need to compute spatial indices inside the same polygonal domain (Figure 5.4.10) that delineated the sampled area.

(2) Discritisation: The computations for a given year are weighted by areas of influence attributed to each sample for that year, the spatial population being closed by zero-density values, if any, or by the limits of the domain. The area of influence of a sample location is defined as the area made up of the points in space that are closer to this sample than to others. It can be evaluated by overlying a very fine regular grid and counting grid points closer to the sample. The surveyed domain is finely discretised, here 100 times (parameter *ndisc*).

(3) Max influence of sample : When there are few gaps in sampling, e.g. through bad weather, which might cause a bias in the indices. The influence of each sample was limited to a distance *dlim* = 13 nautical miles in order not to extrapolate its value unduly.

(4) Mean lag between samples: The microstructure index is taken as the relative decrease of the covariogram between distance zero and a distance h0 chosen to represent the mean lag between samples. Here. h_0 = 5 nautical miles.

Index	Abbrev.	Units or range	Population characteristics
Centre of gravity	*CG*	geographical coordinates	Mean geographic location of the population
Inertia	*I*	square nautical miles	Dispersion of the population around its centre of gravity
Isotropy	*Iso*	[0, 1]	Elongation of the spatial distribution of the population
Positive area	*PA*	square nautical miles	Area of presence occupied by the stock, even with a low density
Spreading area	*SA*	square nautical miles	A measure of the area occupied by the stock that takes into account variations in fish density.
Equivalent area	*EA*	square nautical miles	An individual-based measure of the area occupied by the stock
Microstructure	*Mi*	[0, 1]	The fine-scale variability of the fish density surface

Table 5.4.2 List of the spatial indices and the population characteristics they are thought to be related to.

Average spatial pattern across ages

The location of the population is summarized by the position of the centre of gravity (CG) for the different age groups over the study period (Figure 5.4.12). The CGs of sole aged 1 were close to the coast of England (East of Plymouth). Then, the CGs were moving South East for age 2 and 3, with a low interannual variability. The older ages presented a more variable distribution in space of the CGs, covering a large domain. In contrast, the CGs of the samples (not presented) weighted by their areas of influence (but not by sole densities) were stable throughout the time-series. Therefore, the differences in location of the CGs between sole age groups could not be attributed to changes in the sampling design and were interpreted as real spatial shifts. Inside each sole age group, scattering of the CGs indicates some interannual variability. Scattering was greatest for the oldest sole group (age 4 to 7).

The inertia of the sampled population was on average low for age 1 and high for others ages (2 to 7). In addition, the spatial dispersion around the CG was more variable for older ages (Figure 5.4.13). Isotropy was quite stable over the ages (in average). The preferential direction of the distribution was Southwest-Northeast, probably because of the general shape of the domain (Figure 5.4.13). The lowest interannual variability for isotropy was encounter for intermediate ages (1 to 3). The microstructure index was computed using a mean sample lag of 5 nautical miles. In average, it decreased from age 1 to 3, then increased from age 4 to 7 (Figure 5.4.13).. Age 3 showed the most regular spatial density surface. During the study period, the size of the positive area (the area where sole were present) increased from age 1 to 3, then decreased till age 7. Spreading area and equivalent area were closely related (Figure 5.4.13). They increased in a similar manner from age 1 to 4, and then decreased till age 7. They were showing that age 3 and 4 have a better spread in space than the other ages.

5.4.3.4. Multivariate spatial indices

Fisheries survey series result in the estimation of spatial indices that are compiled in Annex F Table F.1 for the Western Channel sole population (age groups 1 to 7). This table of spatial indices constitute a yearly monitoring system with multivariate observations on spatial distribution. The spatial evolution of the population can be represented in the factorial (multivariate) space of the indices (Woillez et al., 2007) and its trajectory can be evaluated to stay or go outside control limits (Petitgas and Poulard, 2009). Multi factor analysis is used to quantify the reproducibility in time of a multivariate structure (indices estimated at age) and a MFA-based distance has been computed. For each age group, the mean position in the factorial space for the reference years is first estimated. Then the distances of each year observation to these age-specific mean positions are computed and normalized by the age-specific variances. Finally, a multivariate spatial index is obtained corresponding to a time series of distance which is for a given year the sum of the elementary distances over ages. The spatial evolution of the stock can be summarised and monitored with this distance.

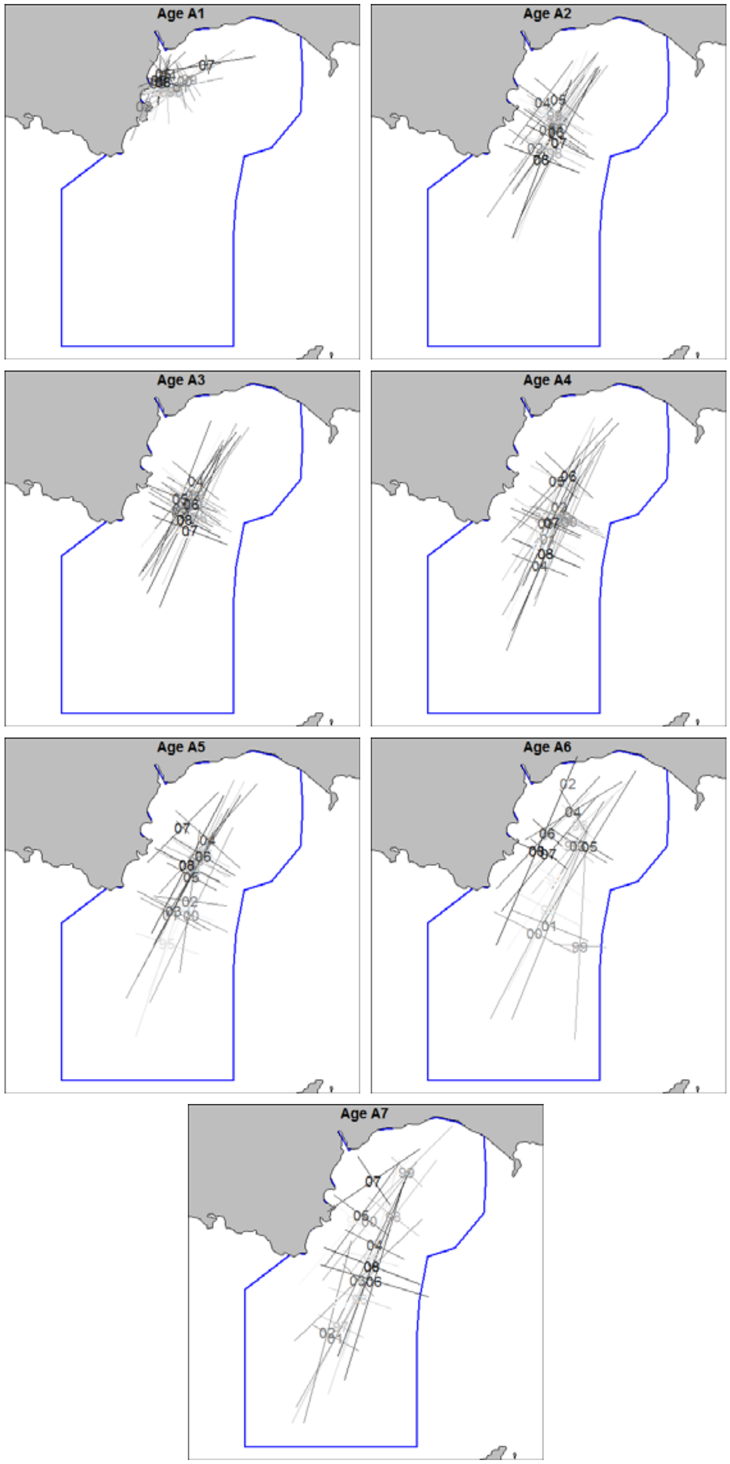


Figure 5.4.12 Distribution of the centres of gravity of sole age groups 1 to 7 computed from 1993 to 2008 (from light grey to dark grey). The bold line delineates the polygonal domain inside of which data have been considered through the 16 surveys.

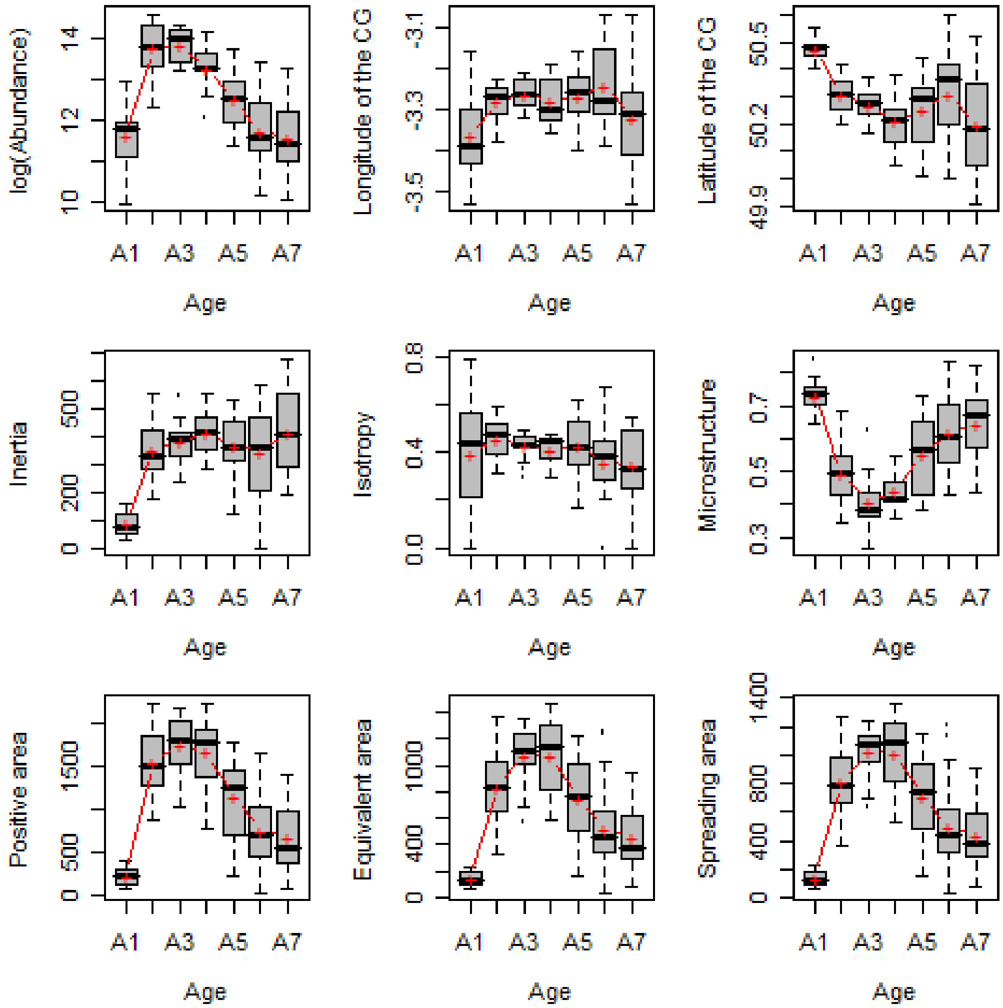


Figure 5.4.13 Box plots and means of the spatial indices for sole age groups 1 to 7. The box stretches from the lower hinge (defined as the 25th percentile or the first quartile Q1) to the upper hinge (defined as the 75th percentile or the third quartile Q3). The median is shown as a line across the box. The mean appears as a red cross. The whiskers extend to the farthest points that are not outliers (i.e. that are within 3/2 times the range between quartiles Q1 and Q3). The extreme values defined as outliers are represented by dots. The means are also linked through the ages.

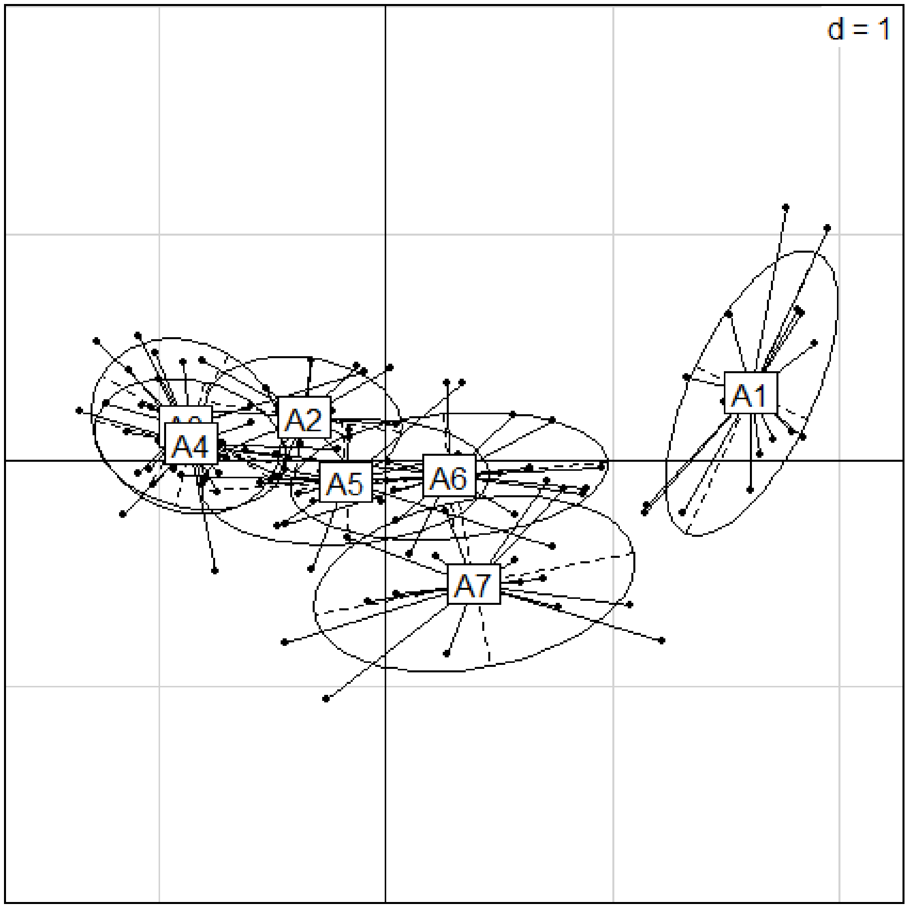


Figure 5.4.14 Graphical depiction of the projection of sole age groups on the principal Multiple Factor Analysis (MFA) plane. Labelled squares represent the centres of gravity of sole age groups observed during 16 surveys. Points indicate the position of the each sole age group for a given year.

The first two axes of the MFA account for 83% (Figure 5.4.14) of the total variance of the data. The high value (11.9) recorded for the first eigenvalue shows that the first MFA factor corresponds to an important direction of variance for each of the years. These two components provide a good representation of the main spatial distributional changes occurring as sole age. The correlation between the indices and the axes are summarized in Table 5.4.3 It will be noticed that no index is correlated enough with axis 3 to appear in the Figure 5.4.15. The main spatial features of the age groups are summarized Figure 5.4.15

Table 5.4.3 Multiple factor analysis (MFA) of 8 spatial indices describing 7 components (age groups 1 to 7) of the sole population of the Western Channel along 16 surveyed years. Summary of correlations between variables and the first 3 MFA factors: number of correlated surveys (- correlation<-0.4. + correlation>0.4) among the 16 considered.

	Principal axis 1	**Principal axis 2**	**Principal axis 3**
Positive area	0+|16-	0+|0-	1+|0-
Equivalent area	0+|16-	0+|0-	1+|0-
Spreading area	0+|16-	0+|0-	1+|0-
Longitude of centre of gravity	1+|6-	2+|3-	5+|2-
Latitude of centre of gravity	8+|0-	7+|0-	2+|2-
Inertia	0+|13-	0+|6-	3+|1-
Isotropy	2+|5-	5+|0-	1+|2-
Microstructure	16+|0-	0+|1-	0+|1-

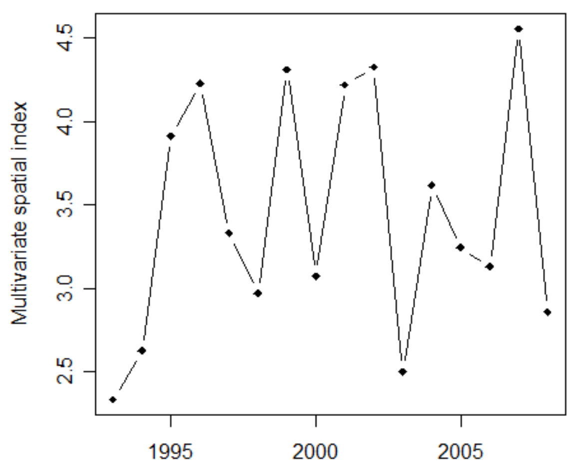


Figure 5.4.15 Time series of the multivariate spatial index characterising the evolution of the sole population spatial distribution.

From left to right on axis 1 (see Figure 5.4.14), microstructure (evenness of the spatial distribution) increases while the indices referring to occupied area (i.e. positive area. spreading area. equivalent area) decrease.

No indices are well correlated to the axis 2 only. Inertia is negatively correlated with both axes 1 and 2. Latitude of the centre of gravity is positively correlated with both axes 1 and 2. Isotropy and longitude of the centre of gravity are poorly correlated with any axes.

The Figure 5.4.14 illustrated the spatial life cycle of the sampled sole population. Age 1 presents a density surface strongly irregular (microstructure) and small spread (occupation areas). Then, sole increases its spread; it is maximal for age 3 and 4 (occupation area). The mean location of the population moved south from age 6 to 7, and presented the highest dispersion (inertia) at age 7. It will be noticed that distribution of age 2 to 6 overlap, meaning that spatial distribution characteristics are changing progressively with the age. Age 2-4 presented the lowest interannual variability (size of the ellipse in the figure).

The multivariate spatial index has been computed based on the chosen reference years (here 1993-1999), and showed a large variability over the whole period)Figure 5.4.15).

5.4.3.5. Selection of raw informative indices

Though principal components and multivariate indices are efficient in summarizing the multivariate spatial evolution of the population, it is useful to select raw indices to explicitly interpret the changes that have occurred.

The selection of only those indices most correlated to the principal components could suffice to summarize the evolution of the spatial indices. But this procedure is not necessarily satisfactory as some of the selected indices can show little continuity in their time series and are therefore difficult to interpret.

In the analysis above, correlation between indices characterised whether the indices fluctuated together or in opposition or without relationship. But continuity along the time series was not considered at all. Continuity is important for characterising the evolution of the spatial distribution in time. The MAF method (Min/Max Autocorrelation Factors) was used here as an automated procedure to select those indices that best summarise the multivariate information on the stock with highest continuity in time (Woillez et al., 2009b). The MAF method allowed constructing principal components (factors), the autocorrelation of which decreases from the first factors to the last ones. Hence the very first factors (MAFs) extract the part of the multivariate information which is the most continuous in time. Therefore, we used the MAF method to select those indices that showed highest continuity in time as well as being the most correlated to the first MAF.

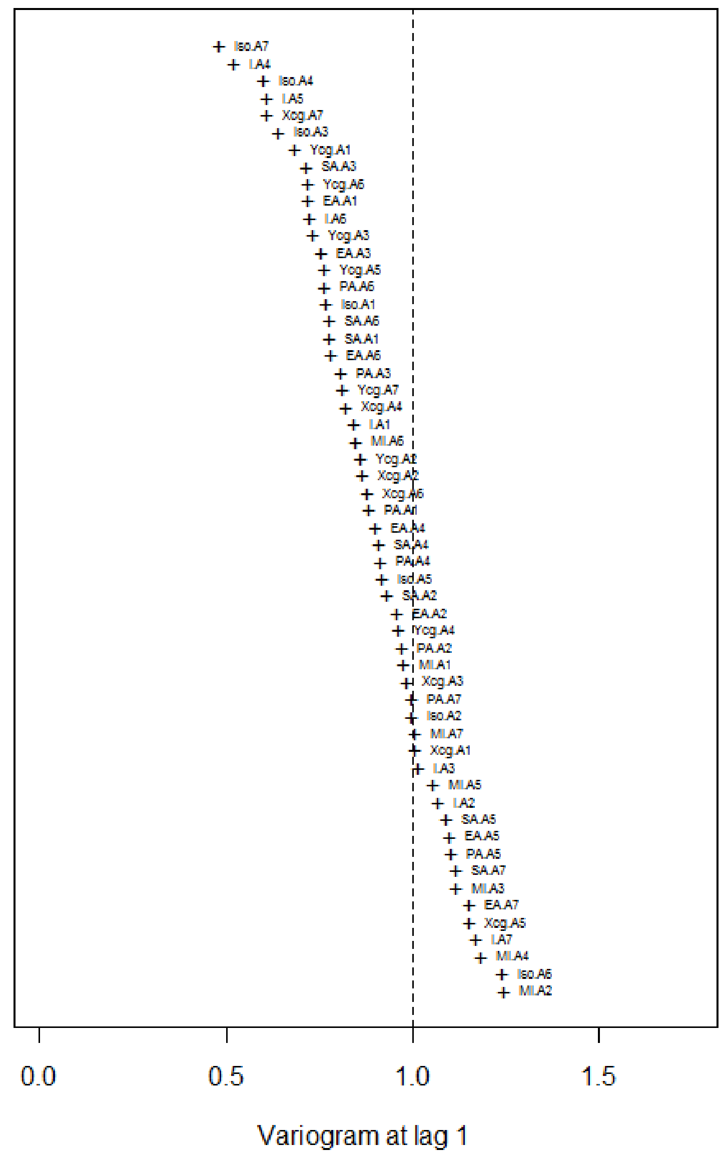


Figure 5.4.16 Plot representing the spatial indices describing the Western Channel sole stock, ordered according to their time continuity for the period 1993-2008.

The full set of indices comprised 56 spatial indices for the 7 age groups. All indices were ranked in ascending order of their variogram value at lag 1 year (Figure 5.4.16). To construct the MAFs, only those indices were retained which had a variogram value at lag 1 lower than 0.723 (10 indices). The number of years in the time series is 16: there are more observations than the number of variable to construct the MAFs. Nevertheless, a procedure was used to robustify the estimation of the MAFs by adding white noise to each index (Woillez et al., 2009b). So, the MAFs were calculated for a given number of realizations (1000) with independent white noises, where the final MAF was obtained by averaging the MAFs over all realizations (Figure 5.4.17).

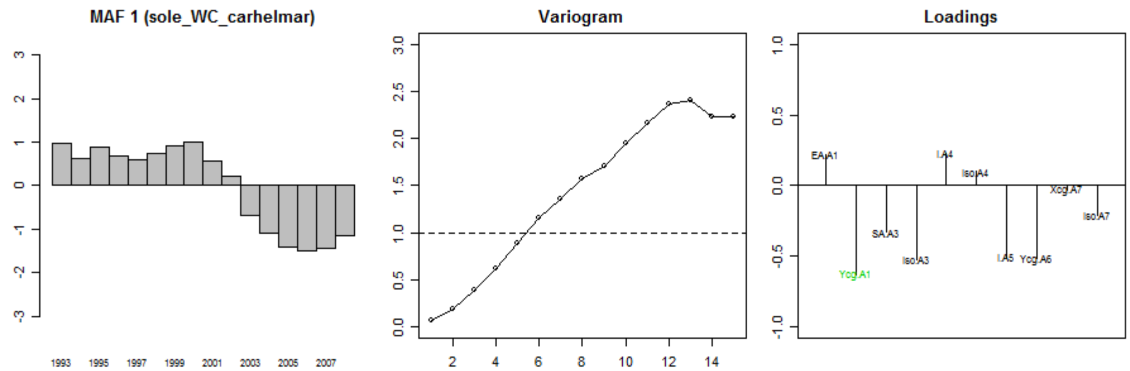


Figure 5.4.17 Time series of the first MAF, its corresponding variogram and loadings associated to each indicator for the Western Channel sole.

Then the indices with highest continuity were selected based on their loadings and the variogram of the MAFs. Here we considered the first MAF to rank the indicators in descending order of their continuity and the 6 most continuous were selected to best represent the evolution in time of the spatial distribution (Figure 5.4.18). These indicators are the latitude of the centre of gravity at age 1, the isotropy at age 3, the latitude of the centre of gravity at age 6, the inertia at age 5, the spreading area at age 3 and the inertia at age 4. By construction, these are the most continuous in time as well as the most correlated to the multivariate structure of all indicators. They should thus allow interpretation of the changes detected using the multivariate spatial indicator.

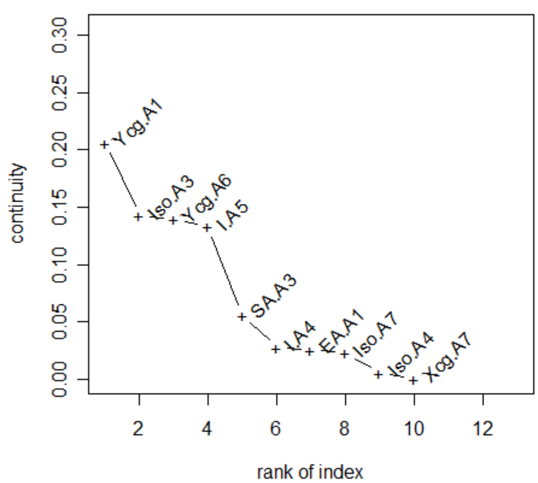


Figure 5.4.18 Indices ranked according to their continuity on the first MAF for the Western Channel sole stock.

5.4.3.6. Detection of changes in the spatial distribution

A decision interval CUSUM monitoring scheme was applied to the multivariate spatial indicator in order to detect those years in which the stock departed from its reference (Mesnil and Petitgas, 2009). A similar procedure was also applied to the 9 indicators that were used to assist the interpretation. Then, a table of CUSUM out-of-control deviations is constructed to serve as a diagnostics table (Table 5.4.4, & Petitgas, 2009). In this table, the deviations in the different indicators are quantitative and given in similar units of variance, which facilitates their integrated assessment. The CUSUM out-of-control table also shows how deviations repeat over time and thus provides a view of the history of spatial changes.

Reference years were set to 1993-1999: a period where the fishing mortality was stable and at a higher level. CUSUMs are tuned so as to present large in-control average run length, meaning that the risk of false alarm is low, and small out-of-control average run length (2 years and lower) meaning that a significant change is rapidly detected (Table 5.4.5).

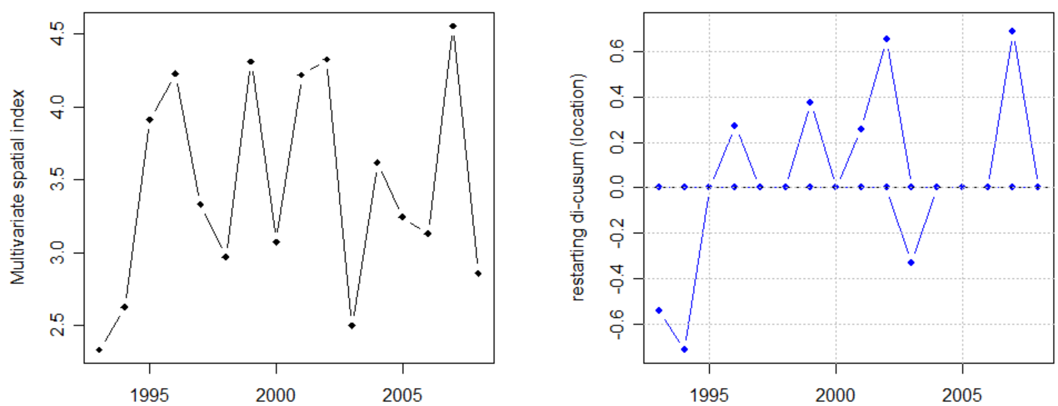


Figure 5.4.19 Time series of the multivariate spatial indicator and its corresponding decision-interval CUSUM control chart to achieve its monitoring. The values above the threshold indicate an out-of-control state (red dots). The detection is achieved with an average false alarm rate of 0.046 and an alarm detection time of 2.0 years. The parameters of the CUSUM scheme are k = 0.8 (allowance) and h = 1 (decision interval). Reference years were set to 1993-1999.

Table 5.4.4 CUSUM diagnostics table for Western Channel sole using spatial population indicators. Values are the out-of-control deviations from the reference mean for each indicator in standard deviation units. The reference period is 1993-1999. The procedure does not signal any alarm. Multivariate indicator leads the diagnostics, while univariate indicators assist the interpretation. CG is the abbreviation of centre of gravity.

Year	Multivariate spatial	Latitude of the CG	Isotropy	Latitude of the CG	Inertia	Spreading area	Inertia	Diagnostic
	total	age 1	age 3	age 6	age 5	age 3	age 4	
1993	0	0	0	0	0	0	0	Ref
1994	0	0	0	0	0	0	0	Ref
1995	0	0	0	0	0	0	0	Ref
1996	0	0	0	0	0	0	0	Ref
1997	0	0	0	0	0	0	0	Ref
1998	0	0	0	0	0	0	0	Ref
1999	0	0	0	0	0	0	0	Ref
2000	0	0	0	-1.44	0	0	0	Ref
2001	0	0	0	0	1.01	0	0	Ref
2002	0	-1.78	0	1.29	0	0	0	Ref
2003	0	0	0	0	0	0	0	Ref
2004	0	1.30	0	0	0	-1.78	0	-
2005	0	1.78	0	0	0	-1.39	0	-
2006	0	0	0	0	0	0	0	-
2007	0	3.56	0	0	-1.93	0	-1.54	-
2008	0	0	1.20	0	0	0	0	-

Table 5.4.5 Parameters of the CUSUM monitoring schemes for Western Channel sole spatial indicators. The reference period is 1993-1999. Parameters are: mean (mu) and standard deviation (sd) in the reference period; allowance (k in sd units); decision interval (h in sd units); average run length (ic.arl. time in years) of the CUSUM to a false alarm (also noted ARL(0)); run length (ic.rl.25. in years) of the CUSUM corresponding to the first quartile of the run length distribution; average run length (oc.arl. in years) of the CUSUM to detect a shift in the mean after it has happened (also noted ARL(2k)). YCG is the abbreviation of the latitude of the centre of gravity and SA the spreading area.

Parameters		Multivariate spatial	YCG at age 1	Isotropy at age 3	YCG at age 6	Inertia at age 5	SA at age 3	Inertia at age 4
Mean	mu	3.39	50.46	0.40	50.27	387.71	1015.29	435.86
Standard deviation	sd	0.78	0.02	0.06	0.16	97.06	144.95	88.32
Allowance	k	0.80	1.10	1.00	0.80	0.80	0.80	0.80
Decision interval	h	1.00	1.00	1.00	1.00	1.00	1.00	1.00
In-control average run length	ic.arl	21.6	45.8	35.3	21.6	21.6	21.6	21.6
In-control run length (1st Qt.)	ic.rl.25	6.0	13.0	10.0	6.0	6.0	6.0	6.0
Out-of-control average run length	oc.arl	2.00	1.70	1.80	2.00	2.00	2.00	2.00

Considering the multivariate spatial indicator only Western Channel sole stock has not experienced any change in its spatial distribution (Table 5.4.5). However, when looking at the time series of the raw informative indicators, some changes have occurred (Figure 5.4.20). The latitude of the centre of gravity at age 1, as well as the isotropy at age 3, showed an increase. The latitude of the centre of gravity at age 6 and the spreading area at age 3 showed a high variability, while inertia at age 4 and 5 decreased. But, overall the changes in the multivariate structure were not enough in total to identify a significant change in the spatial distribution of the Western Channel sole stock.

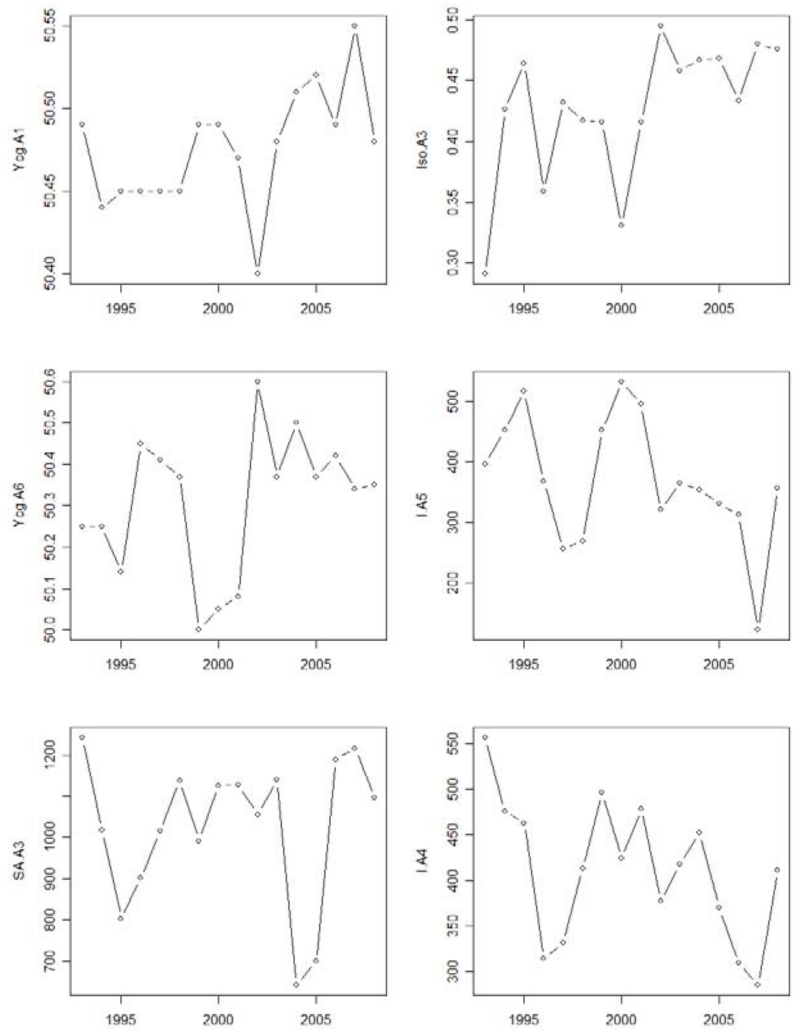


Figure 5.4.20 Time series of informative raw indicators that have signalled years that departed from the reference period. These indicators are the longitude of the centre of gravity at age 1 (YCG.A1), the isotropy at age 3 (Iso.A3), the longitude of the centre of gravity at age 6 (YCG.A6), the inertia at age 5 (I.A5), the spreading area at age 3 (SA.A3) and the inertia at age 4 (I.A4).

5.4.4. Evaluation of the effects of the multi-annual plan on the ecosystem.

5.4.4.1. Impacts of the plan on the ecosystem

Few changes in the spatial distribution of the fleets have been discernable from the relatively course rectangle based data available, see section 5.4.1.2. There are some changes suggested by the VMS data, but generally these relate to relative effort distribution in the UK fleet, not a change in the area fished. Changes in overall effort appear to have been small in most fleets. No spatial effort data was available for the French fleet netting fleet as these smaller boats are not required to carry VMS data.

The UK beamtrawl fleet has recently experimented with changing gears to more environmentally friendly gears, but it is too early to assess the impact of these changes on the ecosystem.

Consequently there is little indication of an effect on the ecosystem beyond the exploited commercial species indicated in the above sections.

5.4.5. Biological sustainability of the plan to 2015

5.4.5.1. Reference points

The multi-annual target of F=0.27 set in the plan on the basis of the selectivity determined in the 2006 assessment. Although the assessment has been rejected recently the rejection was on the basis of the estimates of absolute F in the most recent year, not on the basis of the selectivity pattern and biomass reference points, which are mostly dependent on data further back in the assessment. Therefore there is no new evidence to suggest that the long-term multi-annual target is unsuitable.

5.4.5.2. MSY by 2015

Without estimates of absolute values of F it is not possible to determine if F_{MSY} can be achieved by 2015. STECF in 2009 provided advice to the commission as a special request on western channel sole. The advice was as follows:

"In response to the current request STECF carried out a simple catch curve analysis based on commercial catch data. The results indicate that total mortality (Z) since 2002 appears to have been on average in the region of Z= 0.42. Assuming that the natural mortality (M) for VIIe sole is 0.1, this implies that on average, fishing mortality (F) in recent years has been about F=0.32. Hence to achieve a target fishing mortality rate of F=0.27 in 2010, would imply a reduction in fishing mortality of about 15 % over recent average levels.

STECF therefore advises that if the objective for managers is to achieve F=0.27 in 2010, fishing mortality on VIIe sole in 2010 should be reduced by about 15%. STECF notes that according to Article 5 of the management agreement for sole in VIIe (Council Regulation (EC) No. 509/2007: EC 2007a), this implies that the permitted numbers of days at sea for the vessels to which Article 5 applies, should be reduced by 15%. "

On this basis it is possible to achieve the long-term multi-annual target of F=0.27 in 2015, by reducing F in three yearly steps of 10%, i.e. one step in 2010 and a further in 2013. Whether this would allow SSB to increase to levels above B_{PA} is more difficult to assess. However the survey indicates that recent recruitment is higher than recruitment prior to 1997 (Figure 5.4.21), though not showing the exceptional historic recruitments interspersed with generally poor recruitment pattern.

Biomass estimates from the survey (Figure 5.4.21) also suggest that current biomass has been increasing substantially with the highest CPUE values of the consistent time series being estimated for 2008 from the lowest observed levels in 2005.

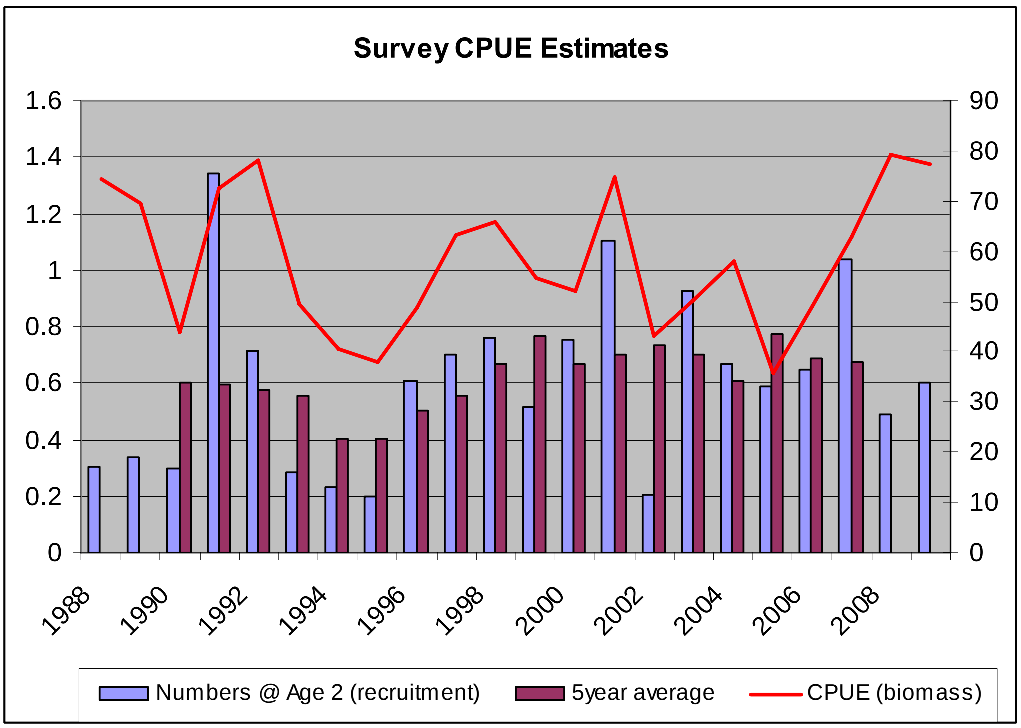


Figure 5.4.21 Recruitment estimated from experimental assessment 1988 to 2009 and 5 year running mean; Biomass CPUE from survey 1988 to 2009.

In conclusion there is no reason to believe it is not possible to achieve the necessary reductions in F by 2015, but in the absence of an assessment it may be difficult advise on exactly how to do this, and to determine whether it has been achieved.

5.4.6. Revising the objectives

Currently there appears to be little reason to revise the multi-annual plan objectives, however there is a need to clarify the plan and make it operationally feasible, without a quantitative assessment.

5.5. Social and Economic Effects of the Plan

Section 6.5.1 gives an overview of the economic aspects of multi-annual plans in general, it is located in the section dealing with the NS plaice and sole plan but should be read also with respect to the plan for Western Channel sole.

5.5.1. Data and Indicators

For the sole fishery in the Western Channel it is possible to identify four fleet segments in the 2009 AER (STECF 2009a) which targeted sole (Belgium TBB 1224 and 2440, UK TBB 2440 and above 40, see ch. 6.5.2 for tables). However, it was not possible to differentiate the economic data between several fisheries these fleets participate in. In recent years the fleet reacted to reduced quotas of sole (Western channel and North Sea) by targeting other species like monkfish, anglerfish or scallops to stay in business. This reduced the dependency on sole and for some fleet segments is now an important but not the most important target species anymore (10-20% of volume and value of landings per vessel).

5.5.2. Unforeseen economic changes

See Section 6.4.2

5.5.3. Economic sustainability of the plan

The plan was implemented in 2008 and for most of the segments we had only economic data up to 2007. Also it has not been possible to disaggregate the data to differentiate between different fisheries carried out by the same fleets. For a sufficient evaluation at least three years of data are necessary to identify overall fleet trends. Therefore, the economists have not been able to draw conclusions.

There was a comment from the RAC representative that the industry expected a long term predictability of TACs by keeping the agreed *F* in year 1 for the first three years. This expectation has not been achieved however, because the agreement was based on a constant *F* which does not mean a constant TAC over this three year period. This type of misunderstanding should be bourn in mind when explaining options on future occasions.

5.6. The added value of the multi-annual plan

As the assessment has not been accepted its not possible to evaluate the outcome in either biological or economic terms of alternative TACs. See also Section 5.5.3.

5.7. SGMOS Evaluation of the Performance of the Plan

5.7.1. Effectiveness

Achievement of the objectives of the plan :- short term

In the absence of an assessment or agreed biological reference points it is not possible to evaluate the status of the stock.

The current absence of an assessment makes implementation of the plan as intended impossible. The survey indicates that *F* has been constant or decreasing slightly, but is unlikely to be decreasing at the rate required by the multi-annual plan.

Effectiveness of the plan has been less than intended for a number of reasons:-

1) Compliance has improved compared to historic periods, but in 2008 the TAC was still overshot.

2) Interpretation of the implementation of the plan is poorly defined, particularly because there is no prescribed fall back position in the absence of an analytical assessment.

3) Even with a single area license scheme, introduce by the UK to improve compliance, TACs may not be controlling fishing mortality, as high grading practices have been observed since its introduction in 2009.

It is premature to evaluate medium term impacts

5.7.2. Utility

UK decommissioning implemented in 2008, in response to the multi-annual plan, has reduced capacity in the beam trawl fleet and likely improved economic performance of the fleet compared to in the absence of a multi-annual plan. However there is no economic data available to quantify the economic performance of the fleets since the multi-annual plans was implemented.

5.7.3. Efficiency (cost-effectiveness)

The SGMOS was unable to evaluate the economic impacts of the multi-annual plan.

5.7.4. Indicators

In the absence of sufficient time-series of observation it has not been possible to evaluate the utility of the indicators selected.

In addition to those in the STECF template (Annex A) It is useful to consider extra indicators for economic and social performance of the multi-annual plans.

* market prices for sole

* comparison of salaries in fisheries to salaries in other primary sectors and national average salaries

Market prices as indicators were discussed in the Impact Assessment for the sole and plaice plan (STECF 2006 ch. 9). For sole the market is quite small and changes in one fishery may affect prices more deeply than for plaice, where the market is larger. The following text table includes ex-vessel prices for sole comparing the prices in Cornwall with the overall price level.

Western Channel Sole	2007 €/kg	2008 €/kg	2009 €/kg
Cornwall	13.8	11.5	8.7
Overall	11.4	10.5	9

It was not possible to draw conclusions from the market prices because it was unclear if this is a separate market. In case of a separate market changes in landings may be the reason for changes in prices.

Biological indicators required in the TORs to assess the multi-annual plan rely on a suitable quantitative assessment, which is not available for this stock.

5.7.5. Sustainability

From the experience so far it is not possible to draw conclusions about the sustainability of the plan compared to those envisaged by the initial evaluations. However, in 2009, there have been improvements in compliance.

5.8. SG-MOS Conclusions for the Western Channel sole Plan

Based on the information above the subgroups overall judgement on the plan is provided below.

Regarding the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy.

It provides an explicit long term objective for exploitation consistent with the CFP that would not be so clear without the plan.

The plan contains a maximum 15% constraint in annual quota change (increase or decrease) as the basic economic instrument. It was introduced to allow for easier adjustments on the fish markets to reduce price jumps.

Regarding the plans success in achieving its stated objectives

> As an assessment is currently not available it is not currently possible to identify whether changes have occurred

Regarding the most important elements of the plan that would influence achievement of its objectives.

> Targets for exploitation are preferable to biomass targets to achieve biological sustainability. Long term targets combined with annual rules provide a useful basis for annual decision making on exploitation rates. Constraints on annual change in TAC are expected to be important for obtaining economic stability. This is expected also to improve acceptability to policy makers and stakeholders and therefore implementation.

Regarding specific indicators that would be useful for a future evaluation of this multi-annual plan

> It seems that the indicators currently proposed do not provide sufficiently for some aspects that are important to some stakeholders such as the RACs. There is a need to consult with the stakeholders to see if some additional indicators are necessary and if so identify with them the provision of the necessary data.

Regarding additional data that should be collected in the future to help in evaluating the multi-annual plan

> Additional data suggestions are given below in section 7.5.4

Regarding links that should be made between this and other plans

> Plans should be fishery based.

Regarding elements of the plan that require revision

> It is very important to add a clause describing what to do if the analytical assessment is nolonger accepted.

> Long term plans need to be considered over a number of years. The minimum period that should be considered for routine evaluation is 3 years after implementation. The timing of evaluations of plans needs to be linked to the availability of data. For example 3 years of biological data become available at approximately month 48 and 3 years of economic data at approximately month 60. Thus a full 3 year evaluation cannot be conducted until 5 years from the commencement of the plan.

6. ToR 3 Review of multi-annual plan for sole and plaice in the North Sea R(EC) No676/2007

6.1. Background

An EU Norway scientific meeting which included initial evaluations of a number of stocks provided individual plans for plaice and sole in June 2004 (EC 2004). Similarly an ICES adhoc meeting was held in April 2005 (ICES 2005a) which again looked at single species plans for NS sole and plaice.

The proposal for a multi-annual plan tabled by Commission services in 2005 summarised ICES advice for 2005 (EU 2005b) as follows:

The existence of potentially serious risks with irreversible consequences has been mentioned. There is no consensus on the existence of such risks.

The Community requests, each year, scientific advice on the state of important fish stocks from the International Council for the Exploration of the Sea (ICES) and the Scientific, Technical and Economic Committee for Fisheries (STECF).

These Committees have advised that plaice and sole are mainly caught together in mixed fisheries, and that the stock of plaice is at risk of reduced reproductive capacity, is at risk of being harvested unsustainably, and is overfished in relation to the highest yields that could be taken from the stock. A very large proportion of the plaice caught are discarded. In 2003 the Committees advised that a recovery plan for plaice was needed. In 2004 the advice was that the stock size should be rebuilt to above 230 000 t in 2006 (a 24% increase). A similar advice was provided in 2005.

The same Committees advised that sole in the North Sea are at full reproductive capacity at present, but are at risk of being harvested unsustainably. The stock is overfished with respect to the highest long-term yields that could be taken from the stock. ICES further advised a reduction in catch by 36% in order to maintain the sole within safe biological limits in 2007.

At current levels of fishing mortality the North Sea sole stock will fall outside safe biological levels in 2007.

Advice on long-term multi-annual plans from ICES indicates that at low target fishing mortalities (considerably lower than the present level), low risk to reproduction and high long-term yields are achieved simultaneously. The general pattern is that there is no conflict between the two objectives. A low fishing mortality will lead to high yield simultaneously with a low risk to reproduction that is lower than the 5-10% risk which has generally been considered acceptable by managers. Target fishing mortalities in the range 0.3 to 0.4 are considered appropriate. However, a fixed-TAC multi-annual method would eventually lead to lower yields and higher risks.

The North Sea RAC had been consulted and delivered its opinion in November 2005. After consultations, the Commission presented a proposal to the Council in December 2005 (EC 2005b). Parliament's report and resolution were reported (EC 2006b). The plan was adopted in 2007 (EC2007b Appendix III). Council conclusions stated for s***tocks of plaice and sole in the North Sea***

The Council adopted a Council Regulation establishing a multi-annual plan for fisheries exploiting the stocks of plaice and sole in the North Sea. (EC 2007b).

This Regulation will aim at gradually implementing progressively an ecosystem-based approach to fisheries multi-annual, and will 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 interests of consumers.

The plan will 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.

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

6.1.1. Overall objectives of the plan

Council Regulation (EC) No 676/2007 (EC 2007b) establishing a multi-annual plan for fisheries exploiting stocks of plaice and sole in the North Sea. There has been no change to this first legal text. The objective of the plan is laid down in Article 2 and 3 of the Council Regulation

> *"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 management plan in the first stage

1. The multi-annual 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 management plan in the second stage

1. The multi-annual 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.

No economic, nor any social objectives have been defined.

Management reference points are set up in article 2 to 4.

The plan is multi-species for sole and plaice. There is a significant overlap between this plan and the multi-annual plan for Cod in the North Sea. Consequences of the overlap were obvious in 2008 and 2009 and should lessen in future years.

6.1.2. Period of evaluation of the plan

Article 17 stated :

Evaluation of management measures

1. The Commission shall, on the basis of advice from STECF, evaluate the impact of the multi-annual 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 multi-annual 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.

Accordingly the evaluation period is from the end of 2007 to early 2010.

6.2. Design Issues

The rationale for the target fishing mortality reference points in the long term multi-annual plan is not given in the Council Regulation (EC 2007b). The fishing mortality target reference point for North Sea sole mentioned in the Council Regulation (EC 2007b), originated from “a committee of experts examining multi-annual management plans”. This committee indicates that “the highest yield of sole can be taken at a fishing mortality rate of 0.2 on ages two to six years”. Although it is not explicitly stated which committee report is referred to in this case, it is very likely to be the report of the Report of the ICES ad hoc Group on Long Term Advice (AGLTA) in 2005 (ICES 2005a). Likewise, the fishing mortality reference point for plaice (F=0.3) is based on an advice from the Scientific, Technical and Economic Committee for Fisheries (STECF) that the fishing mortality rate necessary to produce the highest yield from the stock of plaice in the North Sea in the long term. The target F values are comparable with long term maximum sustainable yield proxies given by ICES (ICES 2009c). For North Sea plaice, ICES considers F_{max} a candidate for the reference point consistent with taking high long-term yields. Currently, F_{max} is estimated to be 0.17. This value is thus lower than the target in the multi-annual plan. For sole, candidates for reference points consistent with high long-term yields (and a low risk of depleting the productive potential of the stock) are in the range of $F_{0.1}$–F_{PA}. It should be noted that F_{PA} is poorly defined for this stock. With $F_{0.1}$ being estimated at 0.11 per year, and F_{PA} being estimated at 0.4, a proxy for the high long term yield is thus found in between this range of 0.11-0.40.

It should be noted that the use of single species estimation of biological reference points, such as the ones used in the multi-annual plan and the proxies for long term maximum yields, is currently under much study. For several North Sea roundfish species, ecosystem model results suggest that it is not possible to simultaneously achieve yields corresponding to MSYs predicted from single-species assessments (Mackinson et al. 2009). However, for North Sea plaice and sole, no ecosystem model is currently available to test such hypotheses, mainly due to insufficient diet data needed to parameterize predator prey relations in the sole and plaice food webs. The proportionality between fishing mortality targets of the North Sea sole and plaice multi-annual plan, expressed as F_{plaice}/F_{sole}, is 1.5. Historically, the proportionality between the two F values has generally been lower than this (1.18 on average) although there have been periods where it was at 1.5 or above (Figure 6.1.1). The relationship between F_{plaice} and F_{sole} shows that a decrease in F_{sole} is generally accompanied by an slightly greater decrease in F_{plaice} (Fig. 6.1.2). Given the current estimated fishing mortality rates of the two stocks of 0.75 it is likely that the fishing patterns of the fleets will have to change if the factor of 1.5 is to be achieved. The possibility of reconciling these two F targets in the long term is an issue that should be examined in any impact assessment of this multi-annual plan. It may be that target ranges of F for each species are necessary to allow simultaneous achievement of objectives for both stocks.

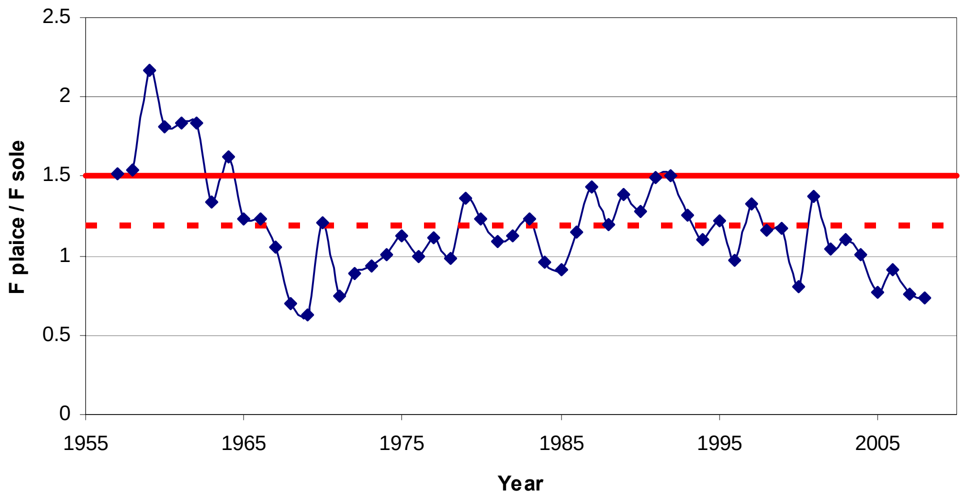


Figure 6.1.1. Time series of proportionality of sole and plaice fishing mortality, expressed as F_{plaice}/F_{sole}.. The solid horizontal red line indicates the same proportionality in the target F values in the multi-annual plan (1.50), and the dashed horizontal red line indicates the mean value over the whole period (1.18).

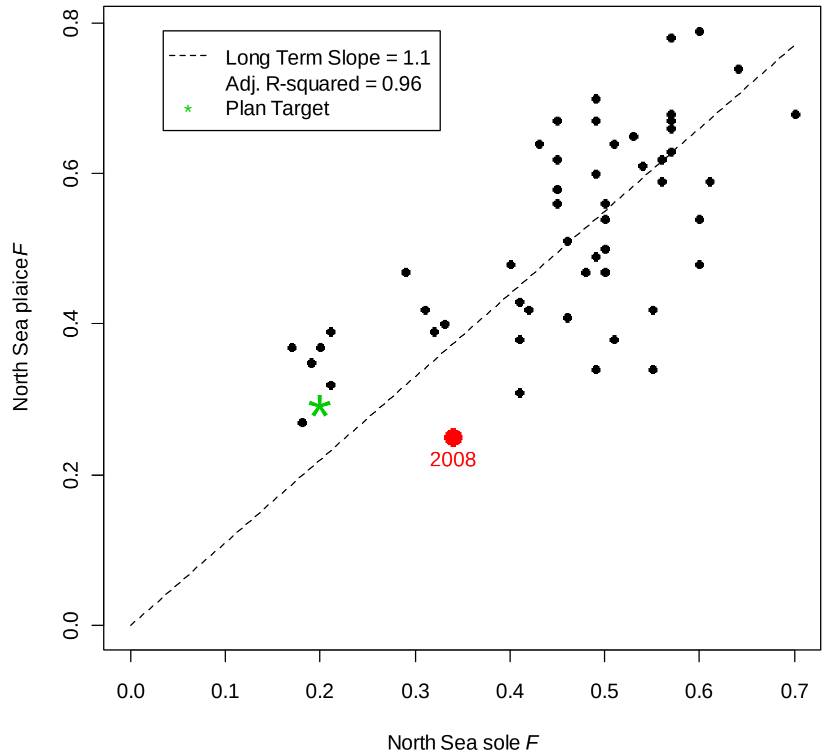


Figure 6.1.2. The relationship between the exploitation rate of North Sea sole (F_{sole}) and North Sea plaice (F_{plaice}) from 1957-2008. The dashed lines show the regression lines fit through all the data and the origin (black) and the slope over the last six years (red points, red line). The multi-annual plan exploitation targets are plotted (green star).

Another potential issue with the formulation of the multi-annual plan is that a degree of interpretation is required in order to implement the described harvest control rules. For example, there is no specification in the plan of how F_{sq} is to be calculated each year. In the case of North Sea sole F_{sq} has been calculated as the mean F of the previous three years in advising the TAC for the next year. Considering that the regulations call for an annual decrease in F, assuming the current F to be equal to the mean of the three years preceding it seems to be an unreasonable assumption, likely to slow progress towards the objectives.

There are a number of general considerations regarding the effects of errors in the assessments and projections, comments on this topic are included in Section 7.4.

6.3. Enforcement and Compliance

The Commission inspectors have organised a round of 6 inspections to the MS concerned by the sole and plaice fisheries multi-annual plan in the North Sea. These conclude that implementing measures are usually in place. The main deficiencies observed concern aspects related to the effort management system and the catch registration systems in place. In particular,

- With regard to the monitoring of effort management the following are noted: Absence of system of effort reports or alternative system developed for vessel less than 15 m length; no link between VMS data and the national catch registration database; discrepancies in the national databases when crosschecking catch registration and VMS data. These issues question the effectiveness of the databases.

- With regard to the catch report reporting system (and quota management): Missing logbook data or discrepancies between logbook figures and figures in electronic data set; a considerable number of landings exceeded the permitted margin of tolerance for recorded weight of 8%; missing information or discrepancies between sales notes figures and figures in electronic data set. While observed in nearly all MS, these aspects that undermine the reliability of the catch report system.

- Moreover, it was observed by EC inspectors that the national fleets are not limited by the applicable fishing effort, especially as a result of additional days allocated to MS for decommissioning fishing vessels.

6.4. Environmental Effects of the Plan

6.4.1. Evaluation of the effects of the multi-annual plan on the fishery

6.4.1.1. Changes in total TACs, catches, discards, landings fishing mortality and effort

Prior to the implementation of the multi-annual plan, TACs for North Sea plaice had decreased for 8 consecutive years (ICES 2009c) (Figure 6.4.1.1). The first multi-annual plan TAC also represented a small (< 5%) decrease but subsequently for 2009 and (potentially) 2010 TACs represent large increases from the previous year. In 2010 the target F value alone would have meant a greater than 15% increase in TAC, requiring article 7, item 2 of the management regulation. Therefore the TAC is likely to be increased by the maximum allowed increase of 15%, corresponding to an F lower than 0.3 per year. The actual landings correspond closely to the TACs for North Sea plaice.

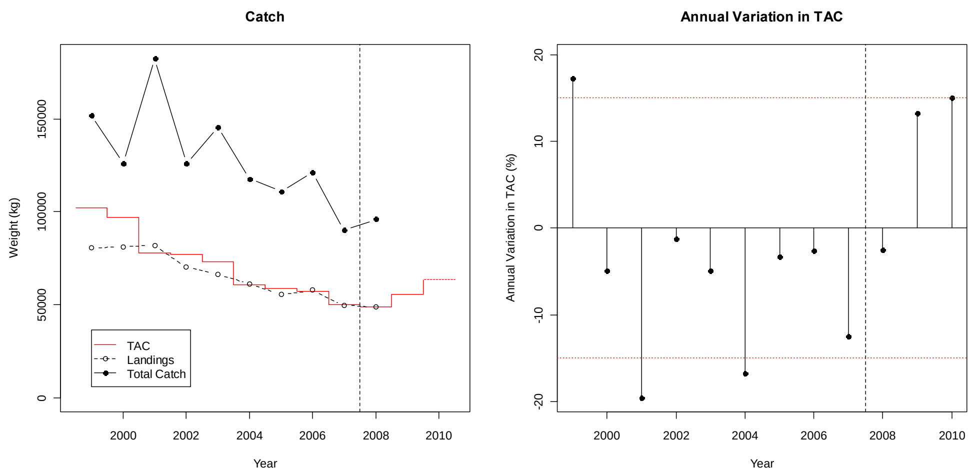


Figure 6.4.1.1. Recent trends in the fishery of North Sea plaice: TACs (note: the value for 2010 is from the ICES advice and is at present a provisional value) and ICES estimates of landings (dashed lines), catch (solid lines); and annual percentage changes in TAC.

The TACs for North Sea sole (ICES 2009c) have fluctuated more over the recent period than those of North Sea plaice (Figure 6.4.1.2). The first multi-annual plan TAC represented a large decrease, just short of the 15% limit, but the TACs have increased thereafter for 2009 and (potentially) 2010. The 15% TAC change clause has not yet been required for the North Sea sole. North Sea sole landings do not correspond as closely to the TACs as is the case for North Sea plaice. The TAC was exceeded from 1999 to 2004, and undershot 2005 and 2006 . In the first year of the multi-annual plan the TAC was exceeded by approximately 10%.

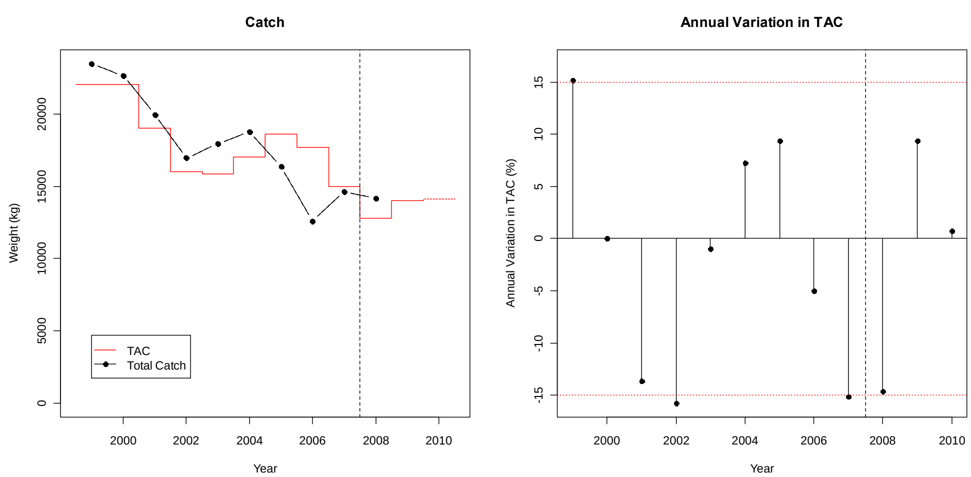


Figure 6.4.1.2. Recent trends in the fishery of North Sea sole: TACs (note: the value for 2010 is from the ICES advice and is at present a provisional value) and ICES estimates of catch (solid lines); and annual percentage changes in TAC.

TAC and official TAC uptake by country for plaice, sole and cod in the North Sea for the period 2006 to 2008 are shown in Annex D, Table D.1 These three species are main targeted species for the fleets taking the main catch of plaice and sole in the North Sea. For these years covering a period before and after the implementation of the multi-annual plan, the TACs up-take has been close to 100% for plaice and cod for the countries taking the main catches of these species. No significant changes in quota uptake by country are found for these species in relation to implementation of the multi-annual plan, and TAC has been a restrictive factor in the fishery both before an after implementation of the multi-annual plan. However, for sole the quota uptake has been lower just before the plan was in effect, i.e. in 2006 and 2007, but has in 2008 increased to be near to 100% for the countries representing the main sole catches. This indicates that the sole TAC has become more restrictive for the main flatfish fisheries in the North Sea in the period after the multi-annual plan entered into force.

Fishing mortality

The most recent assessments are only able to estimate F values up to 2008. The fishing mortality rate for North Sea plaice (Figure 6.4.1.3) has decreased considerably over the last 6 years. This decline thus started *before* the implementation of the multi-annual plan. The perceived decrease has been even more marked, due to a substantial retrospective bias in the XSA assessment, which has successively revised downward the estimates of F for each of the last three assessments. As a result, the realized F in 2008 is lower than the F_{mgt} used to derive the TAC following the multi-annual regulations (Figure 6.3.1.3, red points). However, according to the latest XSA assessment, the F value in 2008 is estimated to be approximately 19% lower than the F value in 2007, exceeding the multi-annual regulation objective of a 10% decrease. Importantly, the F estimate in 2008 is below the target level, F_{tar}, of 0.3 per year. This means that, given implementation of the plan, the F values for plaice should fluctuate around this level.

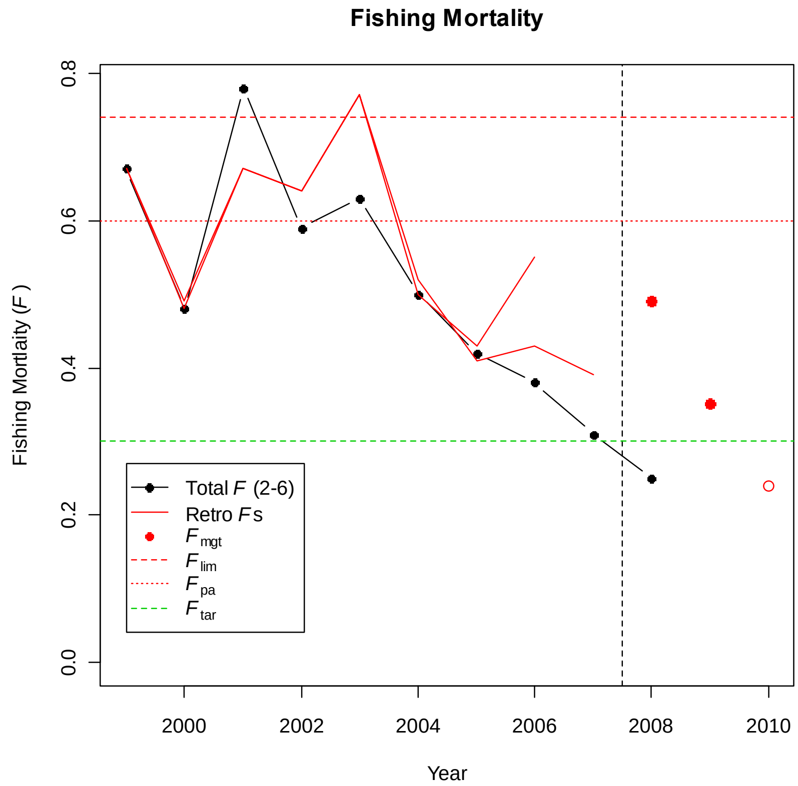


Figure 6.4.1.3. Recent North Sea plaice *F* estimates derived from the ICES XSA stock assessment. The XSA *F* estimates of previous years' assessments are indicated by red lines. The F_{mgt} values on which the TAC advice was based are plotted in red (note: the value for 2010 is from the ICES advice and is at present a provisional value). F_{PA} (0.6; dotted red line), F_{LIM} (0.74; dashed red line) reference points and the management regulation target F_{tar} (0.3; dashed green line) are indicated.

The fishing mortality rate for North Sea sole has shown a downward trend in recent years, although this trend is not as strong as that of plaice (Figure 6.4.1.4). Again, this decline started before the implementation of the multi-annual plan. Unlike the plaice assessment there has been no substantial retrospective bias in estimation of *F* in the last three years for North Sea sole. As a result, the realized *F* in 2008 is close to value for the plan. However, according to the XSA assessment, the *F* value in 2008 is estimated to be approximately 17% lower than the *F* value in 2007. The *F* values used to derive the TACs in 2008-2010 do not show a clear downward trend (Figure 6.3.1.1.d, red points). There are two reasons for this lack of trend. The increase from 2008 to 2009 is the result of a retrospective increase in the *F* estimates. The decrease from 2009 to 2010 is mainly a consequence of the method used to calculate $F_{status\ quo}$ to give the TAC advice. $F_{status\ quo}$ is calculated as the mean *F* of the previous three years and hence the high *F* value in 2005 was included in the calculation of $F_{status\ quo}$ for 2007 and 2008, but was not included in the calculation of F_{sq} in 2009. Even though the *F* value for North Sea sole is estimated to be below F_{PA}, it remains well above the long term *F* target of 0.2 per year.

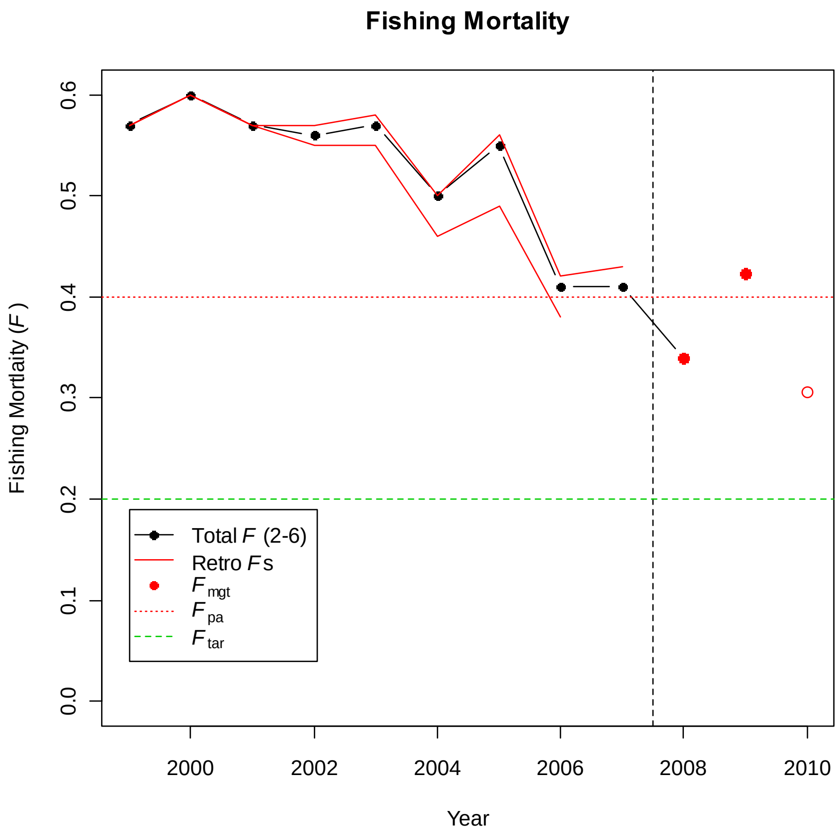


Figure 6.4.1.4. Recent North Sea sole *F* estimates derived from the ICES XSA stock assessment. The XSA *F* estimates of previous years' assessments are indicated by red lines. The F_{mgt} values on which the TAC advice was based are plotted in red (note: the value for 2010 is from the ICES advice and is at present a provisional value). F_{PA} (0.4; dotted red line), reference point and the management regulation target F_{tar} (0.2; dashed green line) are indicated.

Partial fishing mortalities

To investigate whether there are any observed changes in fishing mortality that may be attributed to the measures introduced under the multi-annual plans for flatfish and cod in the North Sea, partial fishing mortalities 2003 to 2008 (Table 6.4.1.1) were estimated for each of the vessel groupings that exploit these species. In principle, it is possible to ascribe vessel group-specific *Fs* separately for landed catch and discarded catch. However, discard data are not available for all vessel groups and species. Consequently annual vessel group-specific partial *Fs* were derived using landings data

The partial fishing mortalities for the human consumption component of the catch of most of the different fisheries have declined since 2003, in line with the general decline in fishing mortality. For both sole and plaice, the largest part of the fishing mortality on the human consumption component of the catches results from the BT2 fishery. For plaice, there has been a disproportionally large decrease in partial F_{hc} for the BT1 fishery, probably caused by the large effort reduction in this fishery. With respect to sole, the GT1 fishery (with the second largest partial F_{hc} throughout the timeseries) showed no substantial reduction in F_{hc}.

Effort and landings

The basis for the evaluations was the database of catches and effort submitted to STECF by Member States under the 2009 data call issued 16 March 2009 (Corrigendum 19 March 2009) and compiled by the STECF-SGMOS-09-05 WG held in September, 2009 (STECF 2009b).

Annual reported landings, discards (where available) and effort by vessel gear groupings were summarised for the period 2002-2008 in an attempt to identify trends that may have arisen as a result of the multi-annual plans.

The fleets exploiting sole and plaice in the North Sea also catch cod and may therefore be subject to the provisions of the multi-annual plan for cod as well as the multi-annual plan for flatfish. For this reason, catches of cod for such fleets were also summarised since any changes in fleet behaviour could have been in response to measures implemented under either multi-annual plan.

Similar to the other regions, (VIIe:- Western English Channel and VIIIa,b:- Bay of Biscay) IV : data on North Sea landings (and discards where available) were examined to determine the importance of each species to each vessel grouping. This was done in an attempt to identify those vessel groupings that are most likely to have been affected by measures implemented under the different multi-annual plans. Once such groupings were identified, annual trends in effort were examined to investigate whether any observed changes could be attributed to measures implemented under the multi-annual plans.

Trends in reported effort by vessel gear grouping by country as well as corresponding trends in landings of main catch species (plaice, sole and cod) in the North Sea are shown for the period 2000-2008 in Figs. 6.4.1.5 - 8. Details of all data as well as summary tables of possible trends from 2007 to 2008 are shown in Annex D, Tables D.2-10.

In general, there has been a decrease in effort for all main fleets catching plaice and sole in the North Sea over the period 2000-2008 (Figure 6.4.1.5). There are significant decreases in effort in 2008, when the flatfish multi-annual plan entered into force, compared to effort levels in the previous years (2007 and 2006). These decreases are observed for the beam trawlers fishing with large mesh sizes above 100 mm stretched mesh size (BT1) for the countries taking the main catches, as well as for Danish and English gillnetters (GN1) and English and French otter board trawlers (OTTER). Some of this decrease may be due to diversion to other gears. For the beam trawlers there has in the same period been observed decreased landings for both plaice and cod, but not for sole, (Figures 6.4.1.6-8) while there for the gillnetters only decreased landings for plaice have been observed from 2007 to 2008. For the otterboard trawlers the patterns in effort reduction cannot be associated to similar decreasing landings of any of the species.

Table 6.4.1.1. Partial *F* rates (F_{hc}) for human consumption fisheries on sole and Plaice in Regulation area 3b (Council Reg 43/2009: EC 2009) between 2003 and 2008 (F data derived from ICES WGNSSK 2009f) (Landings data from SGMOS 09-05 apart from landings data from The Netherlands that were provided during this WG).

Partial Fs North Sea

		2003			2004			2005			2006			2007			2008		
SPECIES	REG_GEAR	Land	F hc	partial F hc	Land	F hc	partial F hc	Land	F hc	Partial F hc	Land	F hc	Partial F hc	Land	F hc	Partial F hc	Land	F hc	Partial F hc
PLE	BEAM	233	0.39	0.00125	75	0.3	0.00033	64	0.21	0.00022	45	0.2	0.00014	38	0.15	0.00010	12	0.13	0.00003
PLE	BT1	7151	0.39	0.03836	6176	0.3	0.02688	5102	0.21	0.01758	7660	0.2	0.02382	5241	0.15	0.01385	3012	0.13	0.00695
PLE	BT2	43133	0.39	0.23141	41589	0.3	0.18101	37790	0.21	0.13019	35892	0.2	0.11162	34830	0.15	0.09202	31631	0.13	0.07296
PLE	DEM_SEINE	5	0.39	0.00003		0.3	0.00000		0.21		6	0.2	0.00002		0.15	0.00000		0.13	0.00000
PLE	DREDGE	5	0.39	0.00003	4	0.3	0.00002	17	0.21	0.00006	7	0.2	0.00002	3	0.15	0.00001	7	0.13	0.00002
PLE	GN1	4500	0.39	0.02414	2958	0.3	0.01287	2734	0.21	0.00942	2917	0.2	0.00907	1523	0.15	0.00402	1731	0.13	0.00399
PLE	GT1	1001	0.39	0.00537	1272	0.3	0.00554	1462	0.21	0.00504	1340	0.2	0.00417	987	0.15	0.00261	663	0.13	0.00153
PLE	LL1	1	0.39	0.00001	11	0.3	0.00005	1	0.21	0.00000	2	0.2	0.00001		0.15			0.13	
PLE	none	70	0.39	0.00038	60	0.3	0.00026	27	0.21	0.00009	23	0.2	0.00007	63	0.15	0.00017	18	0.13	0.00004
PLE	OTTER	365	0.39	0.00196	86	0.3	0.00037	71	0.21	0.00024	43	0.2	0.00013	27	0.15	0.00007	15	0.13	0.00003
PLE	PEL_TRAWL	14	0.39	0.00008	12	0.3	0.00005	10	0.21	0.00003	4	0.2	0.00001	1	0.15	0.00000	8	0.13	0.00002
PLE	POTS		0.39			0.3		1	0.21	0.00000	1	0.2	0.00000	1	0.15	0.00000		0.13	
PLE	TR1	6875	0.39	0.03688	7837	0.3	0.03411	7905	0.21	0.02723	11392	0.2	0.03543	9672	0.15	0.02555	14608	0.13	0.03369
PLE	TR2	9295	0.39	0.04987	8823	0.3	0.03840	5750	0.21	0.01981	4945	0.2	0.01538	4380	0.15	0.01157	4657	0.13	0.01074
PLE	TR3	46	0.39	0.00025	25	0.3	0.00011	21	0.21	0.00007	34	0.2	0.00011	7	0.15	0.00002	1	0.13	0.00000
Total	PLE	72694		0.39000	68928		0.30000	60955		0.21000	64311		0.20000	56773		0.15000	56363		0.13
SOL	BEAM	66	0.57	0.00162	38	0.5	0.00082	22	0.55	0.00060	13	0.41	0.00032	18	0.41	0.00039	17	0.34	0.00033
SOL	BT1	97	0.57	0.00238	68	0.5	0.00147	36	0.55	0.00099	49	0.41	0.00121	30	0.41	0.00065	24	0.34	0.00046
SOL	BT2	18955	0.57	0.46488	19300	0.5	0.41728	16250	0.55	0.44583	12927	0.41	0.32052	15375	0.41	0.33253	13976	0.34	0.26872
SOL	DREDGE	3	0.57	0.00007	3	0.5	0.00006	19	0.55	0.00052	5	0.41	0.00012	4	0.41	0.00009	4	0.34	0.00008
SOL	GN1	898	0.57	0.02202	796	0.5	0.01721	830	0.55	0.02277	708	0.41	0.01755	536	0.41	0.01159	718	0.34	0.01381
SOL	GT1	2124	0.57	0.05209	1951	0.5	0.04218	2169	0.55	0.05951	2011	0.41	0.04986	2162	0.41	0.04676	2055	0.34	0.03951
SOL	none	50	0.57	0.00123	58	0.5	0.00125	1	0.55	0.00003	2	0.41	0.00005	2	0.41	0.00004	11	0.34	0.00021
SOL	OTTER	96	0.57	0.00235	73	0.5	0.00158	60	0.55	0.00165	55	0.41	0.00136	23	0.41	0.00050	19	0.34	0.00037
SOL	PEL_TRAWL	23	0.57	0.00056	15	0.5	0.00032	10	0.55	0.00027	12	0.41	0.00030	2	0.41	0.00004	8	0.34	0.00015
SOL	TR1	29	0.57	0.00071	20	0.5	0.00043	19	0.55	0.00052	30	0.41	0.00074	28	0.41	0.00061	35	0.34	0.00067
SOL	TR2	894	0.57	0.02193	803	0.5	0.01736	628	0.55	0.01723	722	0.41	0.01790	776	0.41	0.01678	809	0.34	0.01556
SOL	TR3	6	0.57	0.00015	1	0.5	0.00002	3	0.55	0.00008	2	0.41	0.00005	1	0.41	0.00002	7	0.34	0.00013
Total	SOL	23241		0.57000	23126		0.50000	20047		0.55000	16536		0.41000	18957		0.41	17683		0.34

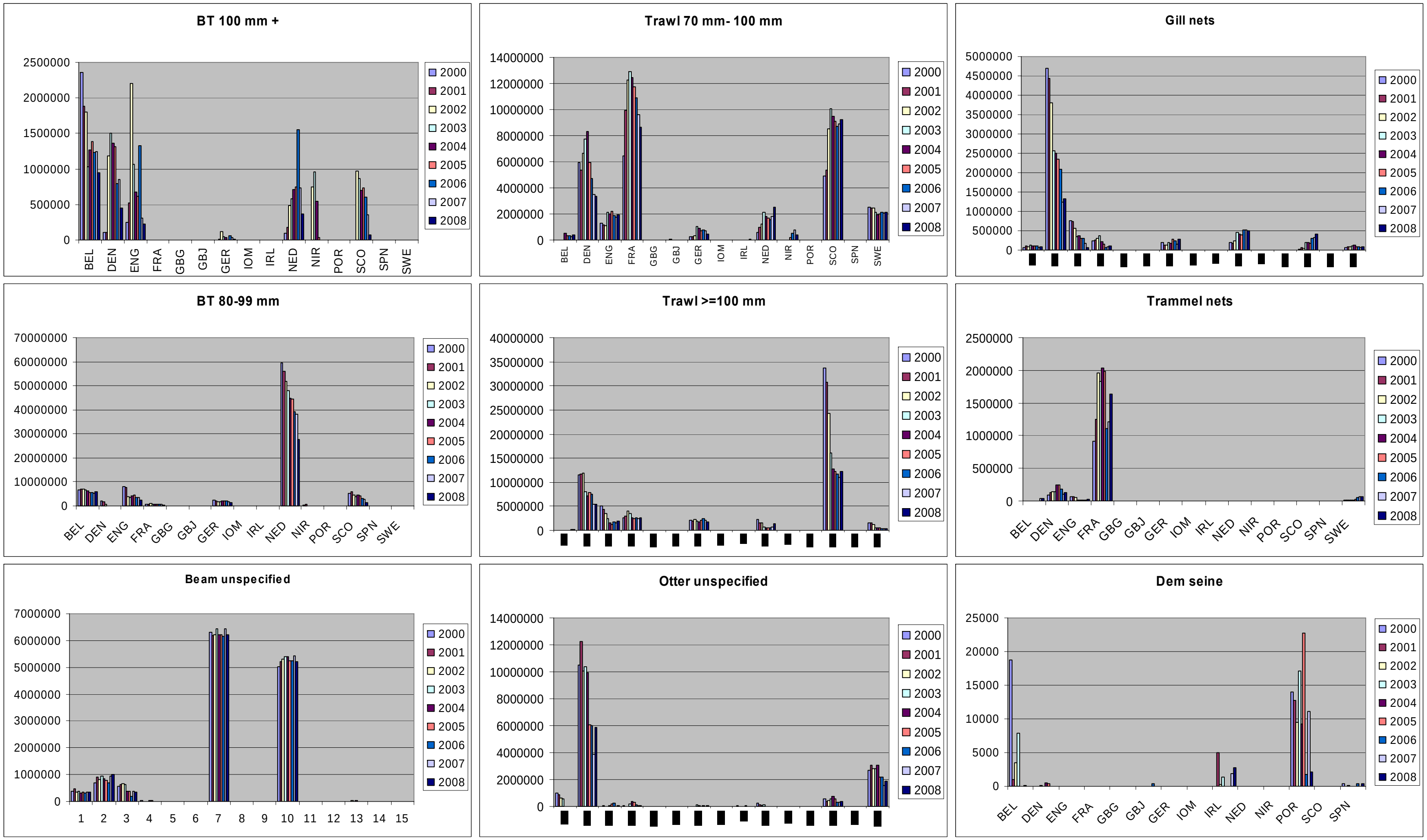


Figure 6.4.1.5. Changes in reported effort (kWdays) by vessel gear grouping by country in the North Sea are shown for the period 2000-2008 (data from SGMOS 09 05: EC 2009b).

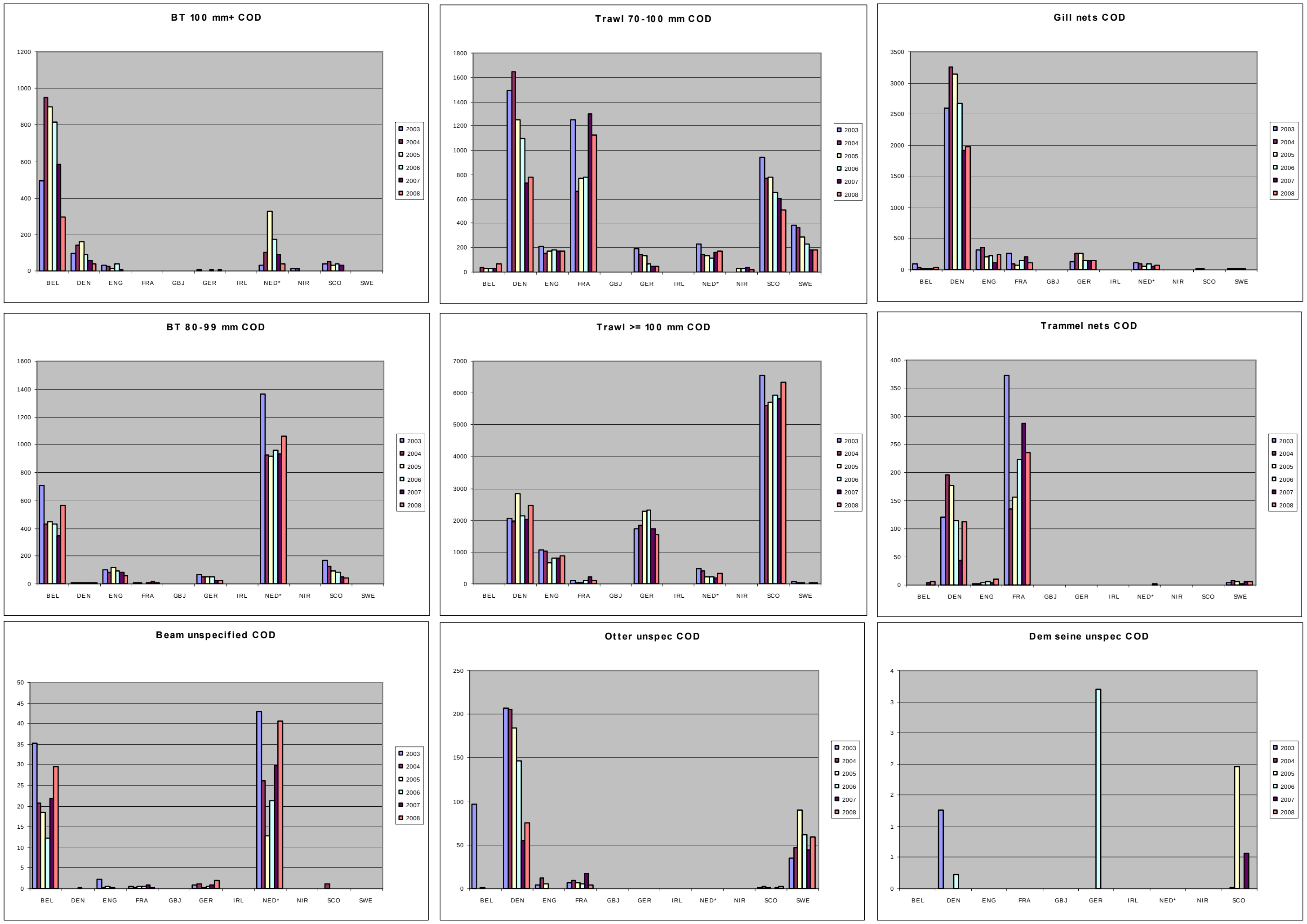


Figure 6.4.1.6. Changes in reported landings of cod by vessel gear grouping by country in the North Sea for the period 2000-2008 (data from EU SGMOS 09 05: EC 2009b).

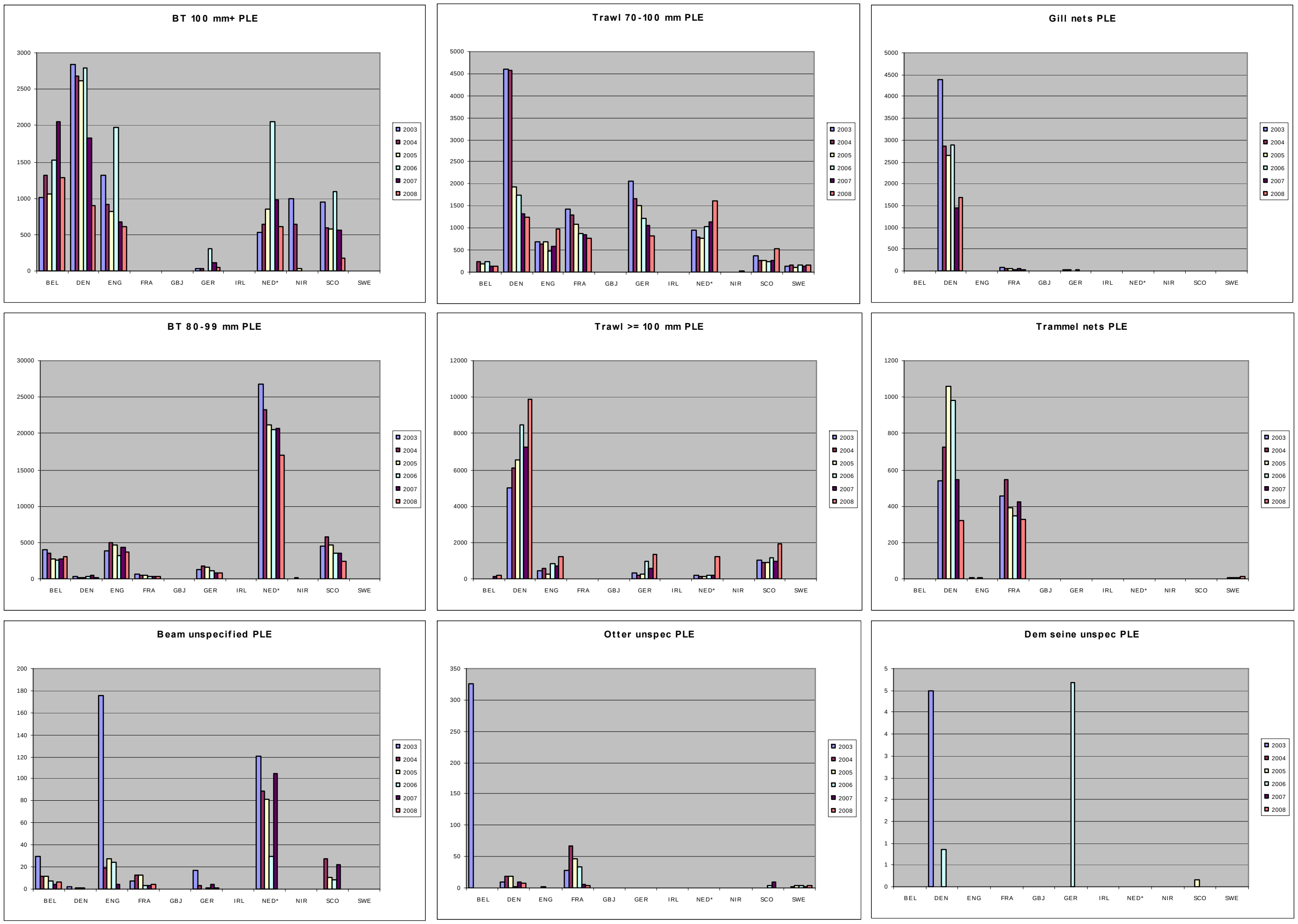


Figure 6.4.1.7. Changes in reported landings of plaice by vessel gear grouping by country in the North Sea for the period 2000-2008 (data from EU SGMOS 09 05: EC 2009b).

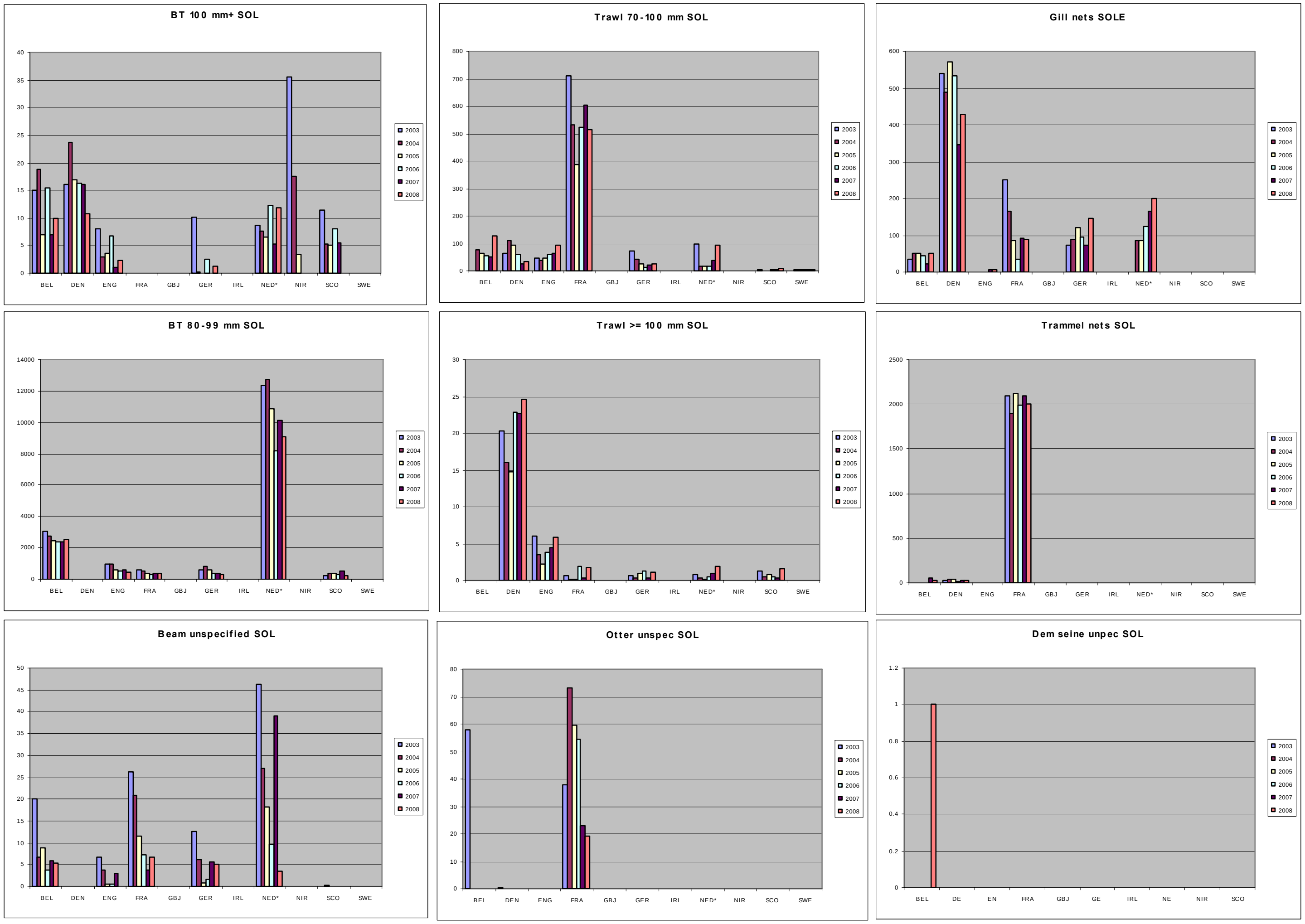


Figure 6.4.1.8. Changes in reported landings of sole by vessel gear grouping by country in the North Sea for the period 2000-2008 (data from EU SGMOS 09 05: EC 2009b).

There is a significant overlap between the flatfish multi-annual plan and the multi-annual plan for Cod in the North Sea. Actual effort reduction regulations made by the EU Commission for certain North Sea fleets between 2007 and 2008 in number of sea days as well as between 2008 and 2009 in kWdays are shown in Annex D, Table D.9-10. Reductions in sea days for small meshed beam trawlers (BT2) was regulated both from 2006 to 2007 and from 2007 to 2008. For trawlers (70-90 mm and 90-100 mm) there were induced reductions in effort from 2007 to 2008. None of these reductions can be exclusively associated to the flatfish multi-annual plan compared to the cod multi-annual plan. From 2008 to 2009, the effort regulations for only one fleet (large meshed beam trawlers) can be exclusively associated to the flatfish multi-annual plan, while fleets facing reductions in effort according to the cod multi-annual plan in this period (25% reduction) were not regulated further according to the flatfish multi-annual plan (10 % reduction). The effect of these reductions can not be evaluated yet as actual effort and landings data are not available for 2009.

There are no indications that effort reduction regulations according to the multi-annual plans have been restrictive for fisheries in 2008, at least not according to the flatfish multi-annual plan. Effort reductions regulated for 2009 are expected to be restrictive for the fisheries in 2009, but no data is available yet to evaluate such an impact.

6.4.1.2. Changes in spatial distribution of fishery.

Spatial trends in effort allocation

The spatial distribution of the main fisheries and fleets catching plaice and sole is presented in Annex E. fleets Apart from the overall shifts in the total nominal fishing effort, the spatial distribution of the fishing effort for the most important fisheries and countries does not seem to have changed abruptly between 2007 and 2008. For the BT1 fishery operated by vessels > 15 m., the spatial fishing effort of the Belgian component seems to have shifted from the North part of the German Bight to the Southern North Sea. The Danish component of this fishery and fleet appears to have been fishing closer to the Danish ports.

For the BT2 fishery operated by vessels >15, the English component appears to be fishing further from the English coast and closer to the port of landing in the Netherlands. The Dutch component of this fishery appears to be fishing closer to the Dutch fishing ports.

All of these changes could be because of the increased fuel costs.

Discards

ICES estimates of discard levels of North Sea plaice are available from the main fleets of North Sea mixed fisheries. Total discard estimates are variable from year to year (Fig. 6.4.1.1). As a result, there is no clear trend in quantity or proportionality of discards to landings by fleet for the most recent years. While there was an increase in discards in the first year of implementation of the multi-annual plan, the degree of uncertainty on these estimates makes it difficult to draw any firm conclusions on the significance of this or to attribute this in any way to the implementation of the multi-annual plan. Absolute discarding levels remain high especially for certain fleets.

Technical measures

The relevant multi-annual plan regulations were examined to determine whether the plans contained any specific technical measures such as closed areas or gear regulations that could potentially have had an effect on the fishery which could have resulted in change in effort allocation and landings composition in 2008 compared to 2007 and 2006. No such new management measures have been implemented in 2008 that are considered to have changed the fishing patterns for the main fleets and fisheries involved in the flatfish fisheries in the North Sea. Consequently, no new technical measures are considered to interact with potential changes according to the multi-annual plans for the recent time period considered.

6.4.2. Changes in the abundance of the stock (SSB)

The spawning biomass of North Sea plaice has fluctuated more or less within the range of the precautionary biomass limits over the recent period to 2004 (Fig. 6.4.2.1). Since 2004, an increase has been observed, gradual at first but more marked in the last two years. The stock is currently above B_{pa}.

Figure 6.4.2.1. Recent North Sea plaice *SSB* estimates derived from the ICES XSA stock assessment. The XSA SSB estimates of previous years' assessments are indicated by red lines. B_{PA} (230 000 t; dotted red line) and B_{LIM} (160 000 t; dashed red line) reference points are indicated.

The spawning biomass of North Sea sole has fluctuated considerably during the last ten years, in one case with observations being lower than B_{LIM} in one year, and higher than B_{PA} in the next. (Fig. 6.4.2.2). The high variability reflects the importance of year-class recruitment strength on the abundance of the stock but is also caused by the knife edge maturation ogive used in the assessment. SSB increased above B_{PA} in the first year following the implementation of the multi-annual plan and remained there in 2009.

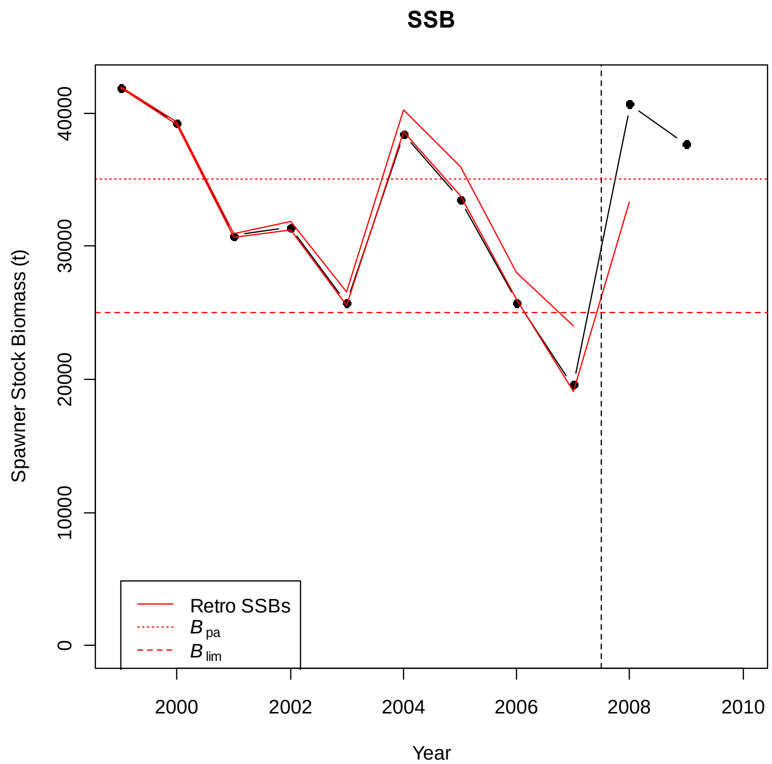


Figure 6.4.2.2. Recent North Sea sole SSB estimates derived from the ICES XSA stock assessment. The XSA SSB estimates of previous years' assessments are indicated by red lines. B_{PA} (35 000 t; dotted red line) and B_{LIM} (25 000 t; dashed red line) reference points are indicated.

6.4.3. Changes in the spatial distribution of North Sea sole and plaice stocks.

6.4.3.1. Introduction

In the framework of the European project FISBOAT (Fisheries Independent Survey Based Operational Assessment Tools, DG–Fish, 6th Framework STREP, Contract 502572), monitoring procedures based on indicators have been developed. They are adapted for single-species stock assessments and management strategies using fishery-independent information from research surveys. The spatial analysis applied on the North Sea sole and plaice surveys uses part of this methodology, in order to detect potential changes in the spatial distribution of the stock.

In brief, a multivariate approach is used to summarise the time series of the stock spatial distribution using spatial indices. The multivariate spatial index is interpreted by selecting those raw indices that best express the multivariate structure as well as have the smoothest time series. The multivariate evolution of stock spatial distribution is then monitored using a statistical process control scheme (decision interval CUSUM) which triggers alarms of deviation from a reference status with set statistical risks of false alarm and no alarm.

6.4.3.2. North Sea sole stock

NS Sole Survey Data

As the spatial distribution of the sole stock is mainly concentrated in the southern part of the North Sea, only survey data from the RV Isis (Netherlands) were considered for the spatial analysis. These data were collected during 22 beam trawl surveys (BTS) in the 3rd quarter of the years 1987 to 2008 in the southern part of the North Sea, ICES division IVb,c.

The study area was between 51.52°N and 55.83°N, between 1.32°E and 8.28°E, and the depth ranged from 11 to 73 m. Sampling was stratified according to ICES rectangles with pseudo-random station positions, and the number of hauls per survey varied between 64 and 100. In this study we considered the data only inside a polygon (Figure 6.4.3.1) defined according to the number of times the ICES rectangles are surveyed per year along the time series. The polygon can be understood to be the core sampled area.

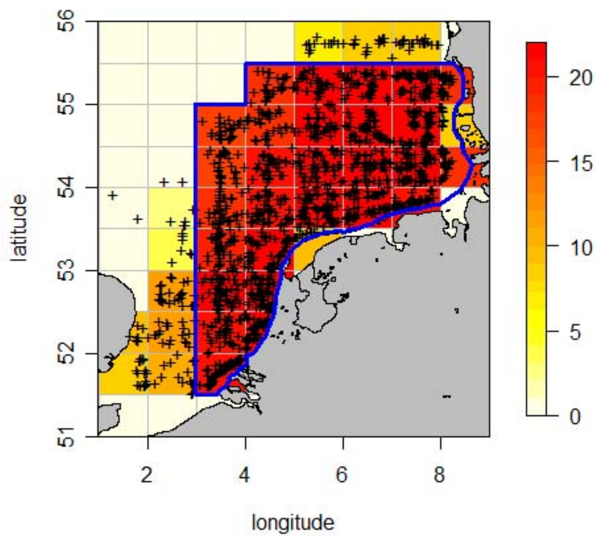


Figure 6.4.3.1 Map of all survey stations (+) during the Isis survey carried out from 1987 to 2008. The blue bold line is the boundaries of the sampled population defined according to the sampling intensity through the 22 surveys considered in the analysis.

A 8 meter beam trawl was used with 8 ticklers, 40 mm mesh in the codend, 120 mm mesh in the net for the Isis survey. Haul duration was on average 30 min at a towing speed of 4 knots, mainly in daylight. Catch numbers and age were recorded for sole (*Solea vulgaris*). For each station, densities were disaggregated by age and expressed in numbers of fish caught per hour trawled. To compute the spatial indices, we assumed that the swept area per hour of trawling was 0.017 nm²/hour, and densities at age were expressed in numbers per square nautical miles. Age group 1 to 7 were considered for the analysis. Changes in the spatial distribution of the North Sea sole stock over time can be firstly examined by plotting densities by age group and year. Figure 6.4.3.2 shows sole densities at age 2 for the last 6 years of the time series (2003-2008).

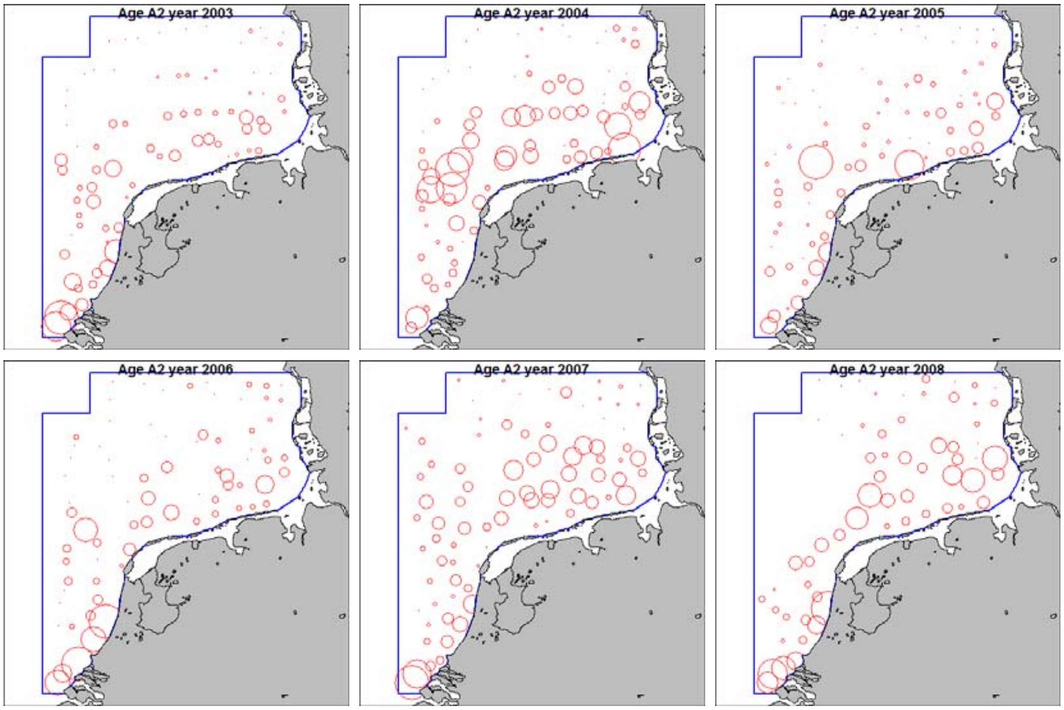


Figure 6.4.3.2 Bubble plots of NS sole aged 2 densities (N/nm²) found during the beam trawl survey Isis in 2003-2008. Bubble radius represents the square root of the density scaled to the maximum density of each map (i.e. each year and age). The bold line delineates the polygonal domain inside of which data have been considered through the 22 surveys.

NS Sole Survey Spatial indices

Selected statistics are chosen to capture spatial patterns of fish populations using fish density data collected during research surveys (Woillez et al., 2007). To handle diffuse population limits, indices are designed not to depend on arbitrary delineation of the domain. They characterize the location (centre of gravity), occupation of space (inertia, isotropy, positive area, spreading area and equivalent area) and microstructure (Table 6.4.3.1). These spatial indices have the potential to be used in a monitoring system to detect changes in spatial distribution (Woillez et al., 2009a).

6.4.4. Input parameters

Spatial indices were calculated using R functions developed at Mines-ParisTech, Centre de Géostatistique. Some of the functions need input parameters which are now given:

(5) Definition of domain: To obtain a series of indices reliable over years, we need to compute spatial indices inside the same polygonal domain (6.4.3.1) that delineated the sampled area.

(6) Discritisation: The computations for a given year are weighted by areas of influence attributed to each sample for that year, the spatial population being closed by zero-density values, if any, or by the limits of the domain. The area of influence of a sample location is defined as the area made up of the points in space that are closer to this sample than to others. It can be evaluated by overlying a very fine regular grid and counting grid points closer to the sample. The surveyed domain is finely discretised, here 100 times (parameter *ndisc*).

(7) Max influence of a sample: When there are few gaps in sampling, e.g. through bad weather, which might cause a bias in the indices. The influence of each sample was limited to a distance *dlim* = 54 nautical miles in order not to extrapolate its value unduly.

(8) Mean lag between samples: The microstructure index is taken as the relative decrease of the covariogram between distance zero and a distance h0 chosen to represent the mean lag between samples. Here, h_0 = 11 nautical miles.

Table 6.4.3.1 List of the spatial indices and the population characteristics they are thought to be related to.

Index	Abbrev.	Units or range	Population characteristics
Centre of gravity	*CG*	Geographical coordinates	Mean geographic location of the population
Inertia	*I*	square nautical miles	Dispersion of the population around its centre of gravity
Isotropy	*Iso*	[0, 1]	Elongation of the spatial distribution of the population
Positive area	*PA*	square nautical miles	Area of presence occupied by the stock, even with a low density
Spreading area	*SA*	square nautical miles	A measure of the area occupied by the stock that takes into account variations in fish density.
Equivalent area	*EA*	square nautical miles	An individual-based measure of the area occupied by the stock
Microstructure	*Mi*	[0, 1]	The fine-scale variability of the fish density surface

NS Sole Survey average spatial pattern across ages

The location of the population is summarized by the position of the centre of gravity (CG) for the different age groups over the study period (Figure 6.4.3.3). The CGs of plaice aged 1 were close to the coast of the Netherlands and extended linearly along it. The CGs of sole aged 2 and above revealed that they were slightly shifting towards Northwest with the age. In contrast, the CGs of the samples (not presented) weighted by their areas of influence (but not by sole densities) are stable throughout the time-series. Therefore, the differences in location of the CGs between sole age groups could not be attributed to changes in the sampling design and were interpreted as real spatial shifts. Inside each sole age group, scattering of the CGs indicates some interannual variability. Scattering was greatest for the extreme age groups (age 1, 5-7).

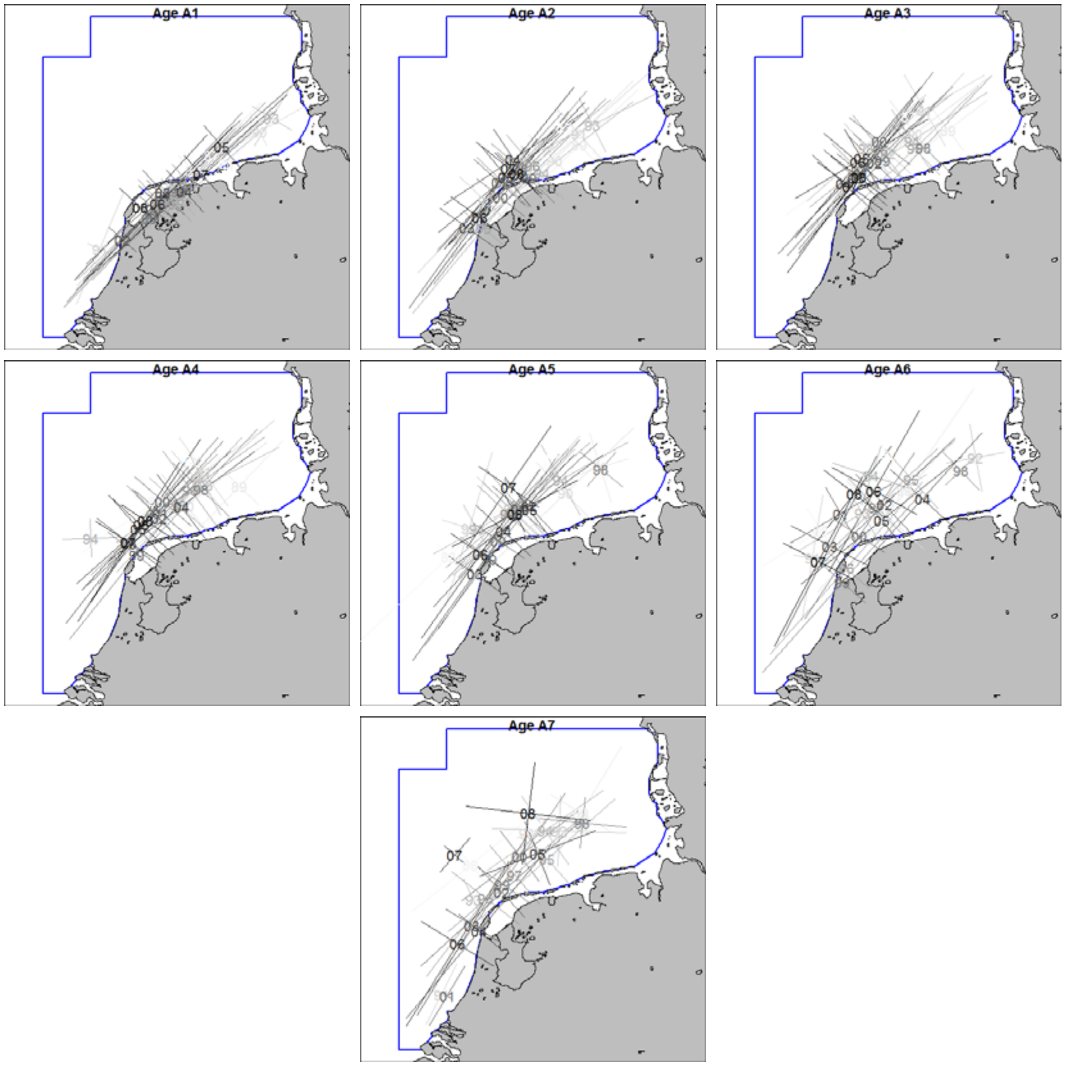


Figure 6.4.3.3 NS sole distribution of the centres of gravity of sole age groups 1 to 7 computed from 19987 to 2008 (from light grey to dark grey). The bold line delineates the polygonal domain inside of which data have been considered through the 22 surveys.

The inertia of the sampled population decreased slowly from age 1 to age 7, indicating a smaller spatial dispersion of the sole stock around the CG with age (Figure 6.4.3.4). Isotropy increased from age 1 to age 3, and is stable for the following ages (Figure 6.4.3.4). The distribution of sole in the Southern part of the North Sea seemingly has a preferential direction, more marked at age 1. The preferential direction of these age groups (Figure 6.4.3.3) was Southwest-Northeast. It also corresponded to the line of the CGs. For other ages, the population did not present any clear preferential direction of the distribution. The microstructure index was computed using a mean sample lag of 11 nautical miles. In average, it decreased from age 1 to 3, but then rose slightly till age 7 (Figure 6.4.3.4). It demonstrated spatial irregularity of fish density are a minimum for age 3. During the study period, the size of the positive area (the area where sole were present) increased from age 1 to 2, then decreased till age 7. Spreading area and equivalent area were closely related (Figure 6.4.3.4). They increased in a similar manner from age 1 to 3, and then decreased till age 7. They show that age 3 has the better spread in space than the other ages.

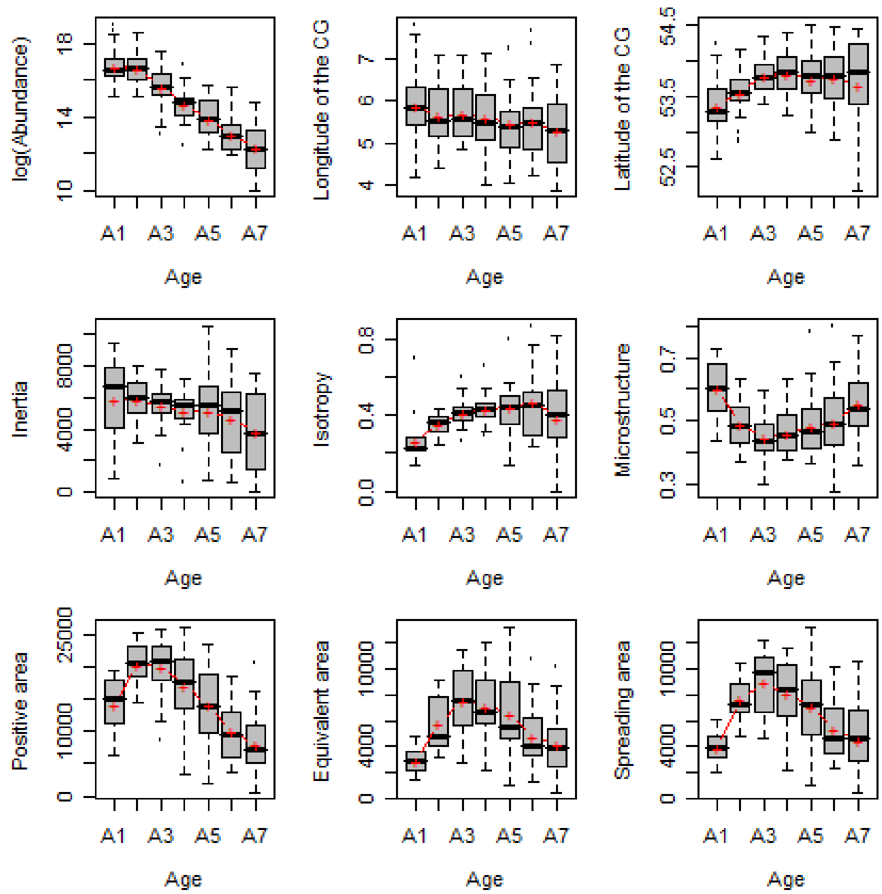


Figure 6.4.3.4 NS sole box plots and means of the spatial indices for age groups 1 to 7. The box stretches from the lower hinge (defined as the 25th percentile or the first quartile Q1) to the upper hinge (defined as the 75th percentile or the third quartile Q3). The median is shown as a line across the box. The mean appears as a red cross. The whiskers extend to the farthest points that are not outliers (i.e. that are within 3/2 times the range between quartiles Q1 and Q3). The extreme values defined as outliers are represented by dots. The means are also linked through the ages.

NS Sole Survey multivariate spatial indices

Fisheries survey series result in the estimation of spatial indices for North Sea sole population (age groups 1 to 7) Annex F Table F.2 . This table of spatial indices constitute a yearly monitoring system with multivariate observations on spatial distribution. The spatial evolution of the population can be represented in the factorial (multivariate) space of the indices (Woillez et al., 2007) and its trajectory can be evaluated to stay or go outside control limits (Petitgas and Poulard, 2009). Multi factor analysis is used to quantify the reproducibility in time of a multivariate structure (indices estimated at age) and a MFA-based distance has been computed. For each age group, the mean position in the factorial space for the reference years is first estimated. Then the distances of each year observation to these age-specific mean positions are computed and normalized by the age-specific variances. Finally, a multivariate spatial index is obtained corresponding to a time series of distance which is for a given year the sum of the elementary distances over ages. The spatial evolution of the stock can be summarised and monitored with this distance.

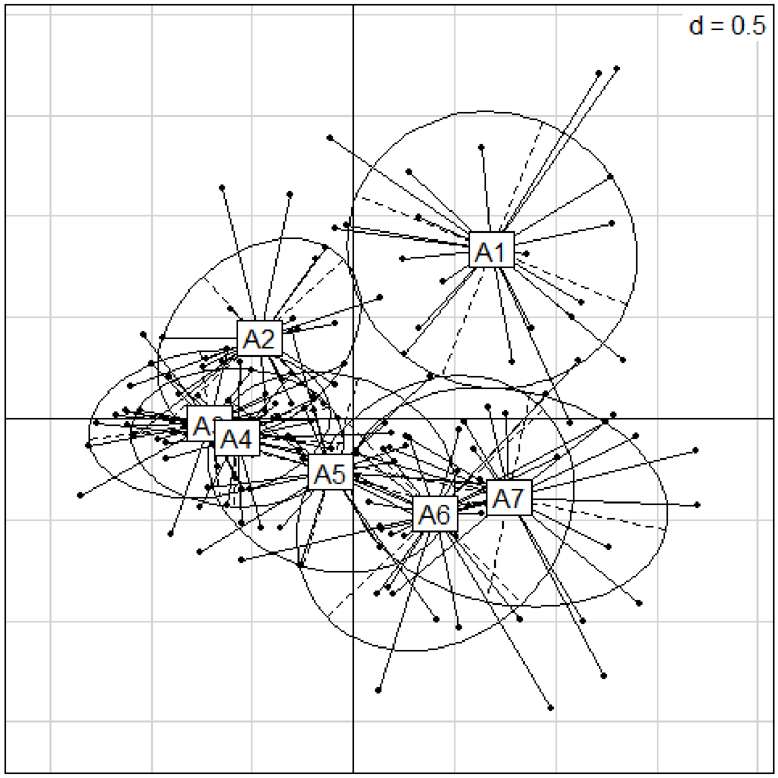


Figure 6.4.3.5 Graphical depiction of the projection of NS sole age groups on the principal Multiple Factor Analysis (MFA) plane. Labelled squares represent the centres of gravity of sole age groups observed during 22 surveys. Points indicate the position of the each sole age group for a given year.

The first two axes of the MFA account for 60% (Figure 6.4.3.5) of the total variance of the data. The high value (12.6) recorded for the first eigenvalue shows that the first MFA factor corresponds to an important direction of variance for each of the years. These two components provide a good representation of the main spatial distribution changes occurring as sole age. The correlation between the indices and the axes are summarized in Table 6.4.3.2. It will be noticed that no index is correlated enough with axis 3 to appear in the Table 6.4.3.2. The main spatial features of the age groups are summarized (Figure 6.4.3.5).

Table 6.4.3.2 Multiple factor analysis (MFA) of 8 spatial indices describing 7 components (age groups 1 to 7) of the NS sole population of the North Sea along 22 surveyed years. Summary of correlations between variables and the first 3 MFA factors: number of correlated surveys (- correlation<-0.4, + correlation>0.4) among the 22 considered.

	Principal axis 1	**Principal axis 2**	**Principal axis 3**
Positive area	0+|21-	6+|0-	1+|2-
Equivalent area	0+|16-	1+|3-	1+|2-
Spreading area	0+|20-	0+|2-	1+|2-
Longitude of centre of gravity	2+|4-	6+|3-	3+|2-
Latitude of centre of gravity	1+|3-	1+|10-	3+|3-
Inertia	4+|3-	9+|1-	6+|1-
Isotropy	1+|5-	1+|10-	5+|3-
Microstructure	16+|0-	8+|1-	0+|0-

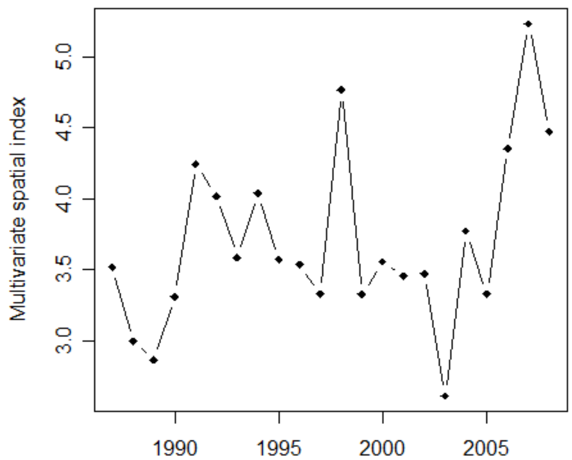


Figure 6.4.3.6 Time series of the multivariate spatial index characterising the evolution of the NS sole population spatial distribution.

From left to right on axis 1 (see Table 6.4.3.2), microstructure (evenness of the spatial distribution) increases while the indices referring to occupied area (i.e. positive area, spreading area, equivalent area) decrease.

From top to bottom on axis 2, latitude of the centre of gravity and isotropy increases while inertia decreases. Most of the indices are correlated to one axis only. Longitude of the centre of gravity is not well correlated with any axes.

Figure 6.4.3.5 illustrates the spatial life cycle of the sampled sole population. Age 1 is the most southerly, with density surface strongly irregular (large microstructure) and small spread (low occupation areas) and with Southwest-Northeast preferential direction in the distribution (low isotropy). Then, with the age, sole moved northwards (centre of gravity), and presented its maximal spread for age 3-4, with a regular density surface (low microstructure). In addition, sole loses its preferential direction with age (higher isotropy), and their densities surface are more irregular (large microstructure). It will be noticed that distribution of most ages (except age 1) overlap, meaning that spatial distribution characteristics are changing progressively with the age.

The multivariate spatial index has been computed based on the reference years (here 1993-2005). These years were chosen according to fishing mortality level (high and stable). The series is quite variable and showed high values for the last years of the series and for 1998 (Figure 6.4.3.6).

NS Sole Survey selection of raw informative indices

Though principal components and multivariate indices are efficient in summarizing the multivariate spatial evolution of the population, it is useful to select raw indices to explicitly interpret the changes that have occurred.

The selection of only those indices most correlated to the principal components could suffice to summarize the evolution of the spatial indices. But this procedure is not necessarily satisfactory as some of the selected indices can show little continuity in their time series and are therefore difficult to interpret.

In the analysis above, correlation between indices characterised whether the indices fluctuated together or in opposition or without relationship. But continuity along the time series was not considered at all. Continuity is important for characterising the evolution of the spatial distribution in time. The MAF method (Min/Max Autocorrelation Factors) was used here as an automated procedure to select those indices that best summarise the multivariate information on the stock with highest continuity in time (Woillez et al., 2009b). The MAF method allowed constructing principal components (factors), the autocorrelation of which decreases from the first factors to the last ones. Hence the very first factors (MAFs) extract the part of the multivariate information which is the most continuous in time. Therefore, we used the MAF method to select those indices that showed highest continuity in time as well as being the most correlated to the first MAF

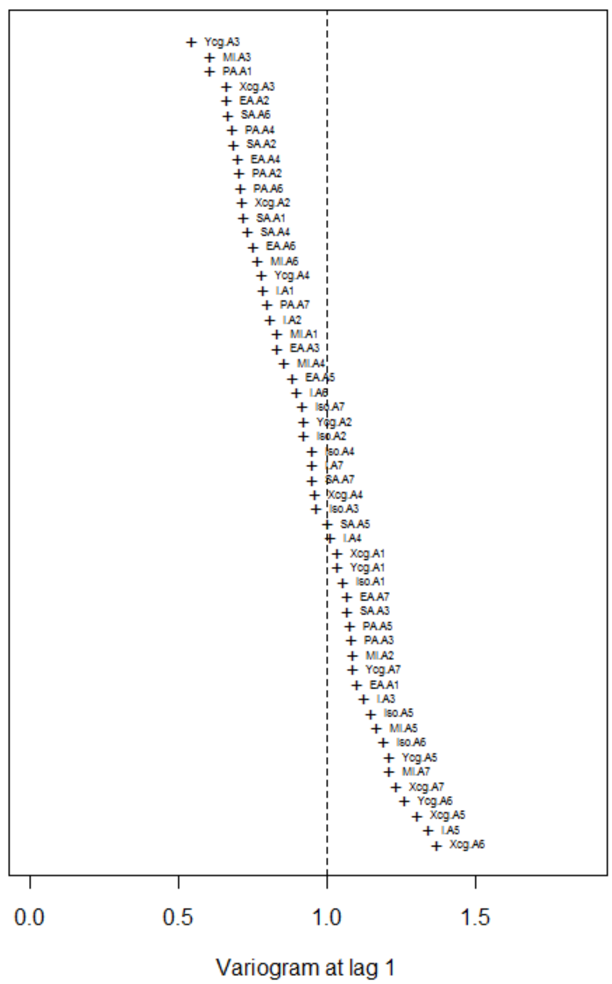


Figure 6.4.3.7 Plot representing the spatial indices describing the N S sole stock, ordered according to their time continuity for the period 1987-2008**.**

The full set of indices comprised 56 spatial indices for the 7 age groups. All indices were ranked in ascending order of their variogram value at lag 1 year (Figure 6.4.3.7). To construct the MAFs, only those indices were retained which had a variogram value at lag 1 lower than 0.716 (12 indices). The number of years in the time series is 22: there are more observations than the number of variable to construct the MAFs. Nevertheless, a procedure was used to robustify the estimation of the MAFs by adding white noise to each index (Figure 6.4.3.8).

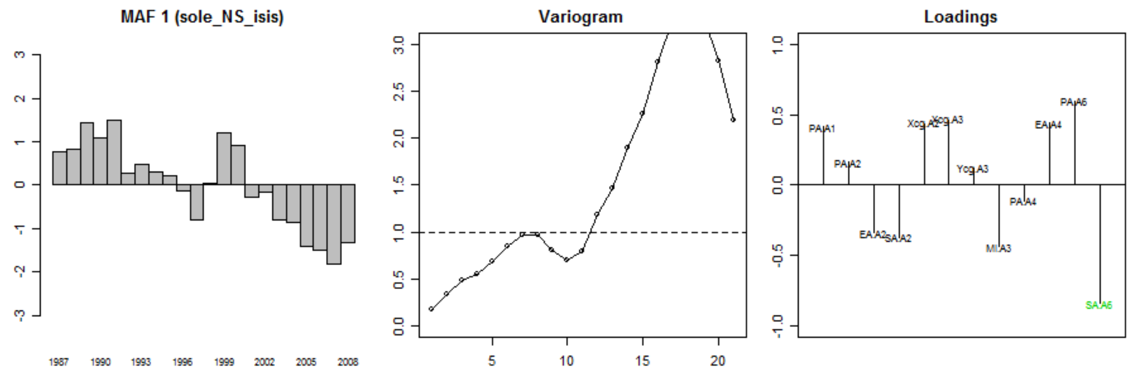


Figure 6.4.3.8 Time series of the first MAF, its correspoding variogram and loadings associated to each indicators for the North Sea sole.

Then the indices with highest continuity were selected based on their loadings and the variogram of the MAFs. Here we considered the first MAF to rank the indices in descending order of their continuity and the 9 most continuous were selected to represent the evolution in time of the spatial distribution (Figure 6.4.3.9). These indicators are the spreading area at age 6, the positive area at age 6, Longitude of the centre of gravity at age 3, the equivalent area at age 4, the microstructure at age 3, the longitude of the centre of gravity at age 2, the positive area at age 1, the spreading area at age 2 and the equivalent area at age 2. By construction, these are the most continuous in time as well as the most correlated to the multivariate structure of all indicators. They should thus allow interpretation of the changes detected using he multivariate spatial indicator.

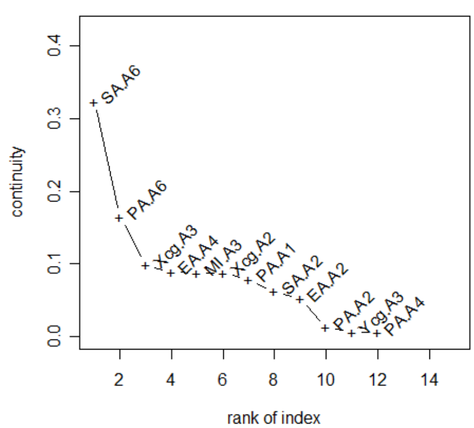


Figure 6.4.3.9 Indices ranked according to their continuity on the first MAF for NS sole.

NS Sole Survey detection of changes in the spatial distribution

A decision interval CUSUM monitoring scheme was applied to the multivariate spatial indicator in order to detect those years in which the stock departed from its reference (Mesnil and Petitgas, 2009). A similar procedure was also applied to the 9 indicators that were used to assist the interpretation. Then, a table of CUSUM out-of-control deviations is constructed to serve as a diagnostics table (Petitgas, 2009). In this table, the deviations in the different indicators are quantitative and given in similar units of variance, which facilitates their integrated assessment. The CUSUM out-of-control table also shows how deviations repeat over time and thus provides a view of the history of spatial changes.

Reference years were set to 1993-2005: a period where the fishing mortality was stable and at high level. CUSUMs are tuned so as to present large in-control average run length, meaning that the risk of false alarm is low, and small out-of-control average run length (2 years and lower) meaning that a significant change is rapidly detected (Table 6.4.3).

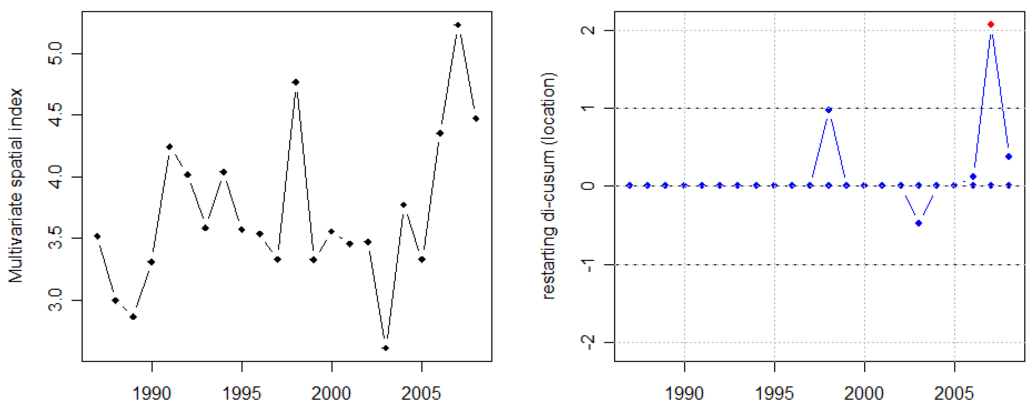


Figure 6.4.3.10 Time series of the multivariate spatial indicator for N S sole and its corresponding decision-interval CUSUM control chart to achieve its monitoring. The values above the threshold indicate an out-of-control state (red dots) The detection is achieved with an average false alarm rate of 0.007 and an alarm detection time of 1.4 years. The parameters of the CUSUM scheme are k = 1.5 (allowance) and h = 1 (decision interval). Reference years were set to 1993-2005.

Table 6.4.3 CUSUM diagnostics table for North Sea sole using spatial population indicators. Values are the out-of-control deviations from the reference mean for each indicator in standard deviation units. The reference period is 1993-2005. The procedure signals an alarm in 2007. Multivariate indicator leads the diagnostics, while univariate indicators assist the interpretation. CG is the abbreviation of centre of gravity.

Year	Multi-V spatial	Spread-ing area	Positive area	Long of CG	Eqvlnt area	Micro-structure	Long of CG	Positive area	Spread-ing area	Eqvlnt area	Diagnostic
	Total	Age 6	Age 6	Age 3	Age 4	Age 3	Age 2	Age 1	Age 2	Age 2	
1987	0	0	0	0	0	-1.67	0	-1.65	0	0	-
1988	0	0	0	0	0	0	0	0	0	0	-
1989	0	0	0	1.92	0	0	2.04	-2.22	-1.04	0	-
1990	0	0	0	0	0	0	0	0	0	0	-
1991	0	0	0	1.56	0	0	0	-1.96	0	0	-
1992	0	0	0	0	0	0	0	0	0	0	-
1993	0	0	0	0	0	0	0	0	0	0	Ref
1994	0	0	0	0	0	0	0	0	0	0	Ref
1995	0	0	0	0	0	0	0	0	0	0	Ref
1996	0	0	0	0	0	0	0	0	0	0	Ref
1997	0	0	0	0	0	0	0	0	0	0	Ref
1998	0	0	0	0	0	0	0	0	0	0	Ref
1999	0	0	0	0	0	0	0	0	0	0	Ref
2000	0	0	0	0	0	0	0	0	0	0	Ref
2001	0	0	0	0	0	0	0	0	0	0	Ref
2002	0	0	0	0	0	0	0	0	0	0	Ref
2003	0	0	0	0	0	0	0	0	0	0	Ref
2004	0	0	0	0	0	0	0	0	0	0	Ref
2005	0	0	0	0	0	0	0	0	0	0	Ref
2006	0	-1.26	-1.14	0	0	2.02	0	0	0	0	-
2007	2.07	0	0	0	0	0	0	0	0	0	Alarm
2008	0	0	0	0	0	0	0	0	0	1.27	-

Table 6.4.4 Parameters of the CUSUM monitoring schemes for North Sea sole spatial indicators. The reference period is 1993-2005. Parameters are: mean (mu) and standard deviation (sd) in the reference period; allowance (k in sd units); decision interval (h in sd units); average run length (ic.arl. time in years) of the CUSUM to a false alarm (also noted ARL(0)); run length (ic.rl.25. in years) of the CUSUM corresponding to the first quartile of the run length distribution; average run length (oc.arl. in years) of the CUSUM to detect a shift in the mean after it has happened (also noted ARL(2k)). XCG is the abbreviation of the longitude of the centre of gravity, EA the equivalent area, PA the positive area, SA the spreading area and MI the microstructure.

Parameters		**Multivariate spatial**	**SA at age 6**	**PA at age 6**	**XCG at age 3**	**EA at age 4**	**MI at age 3**	**XCG at age 2**	**PA at age 1**	**SA at age 2**	**EA at age 2**
Mean	mu	3.56	5718	11437	5.60	7675	0.46	5.47	15486	7863	5783
Standard deviation	sd	0.48	2608	4461	0.52	3166	0.06	0.65	3114	1672	2151
Allowance	k	1.50	0.70	1.00	0.90	0.80	1.00	1.20	1.10	1.00	0.90
Decision interval	h	1.00	1.15	1.00	1.10	1.10	1.20	1.30	1.20	1.00	1.00
In-control average run length	ic.arl	142.2	21.5	35.3	32.8	25.4	51.8	117.0	69.2	35.3	27.5
In-control run length (1st Qt.)	ic.rl.25	41.0	6.0	10.0	10.0	7.0	15.0	34.0	20.0	10.0	8.0
Out-of-control average run length	oc.arl	1.40	2.40	1.80	2.00	2.10	2.00	1.80	1.80	1.80	1.90

North Sea sole stock has experienced a change in its spatial distribution for only one year, 2007 (Figure 6.4.3.10 and Table 6.4.4). Additional years could help be helpful to see if it is the beginning of a longer change of the spatial distribution in time or not. Looking at the time series of the indicators selected to assist the diagnostic is not in favour of a change in the spatial distribution of the North Sea sole stock (Figure 6.4.3.11). No clear trend exists after the reference period.

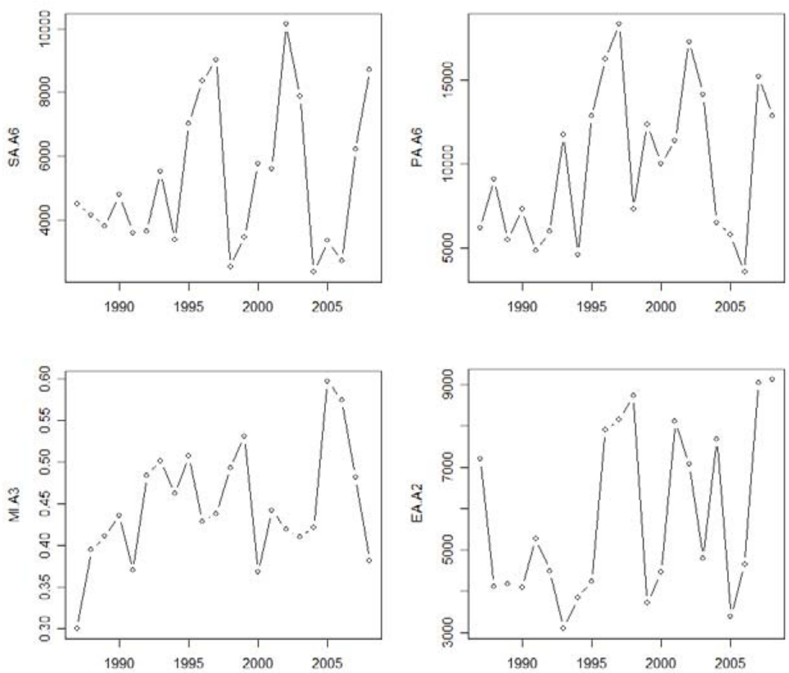


Figure 6.4.3.11 Time series of informative raw indicators for N S sole that have signalled years that departed from the reference period. These indicators are the spreading area at age 6 (SA.A6), the positive area at age 6 (PA.A6), the microstructure at age 3 (MI.A3) and the equivalent area at age 2 (EAA2).

6.4.4.1. North Sea plaice stock

NS Plaice Survey Data

Data considered for the spatial analysis of the North Sea plaice stock, were collected during 13 beam trawl surveys (BTS) carried out by the RV Tridens and Isis (Netherlands) in the 3rd quarter of the years 1996 to 2008 in the North Sea, ICES division IVa.b.c.

The study area was between 51.62°N and 60.75°N, between 3.32°W and 8.17°E, and the depth ranged from 9 to 154 m. Sampling was stratified according to ICES rectangles with pseudo-random station positions, and the number of hauls per survey varied between 121 and 162. In this study we considered the data only inside a polygon (Figure 6.4.4.1) defined according to the number of times the ICES rectangles are surveyed per year along the time series. The polygon can be understood to be the core sampled area.

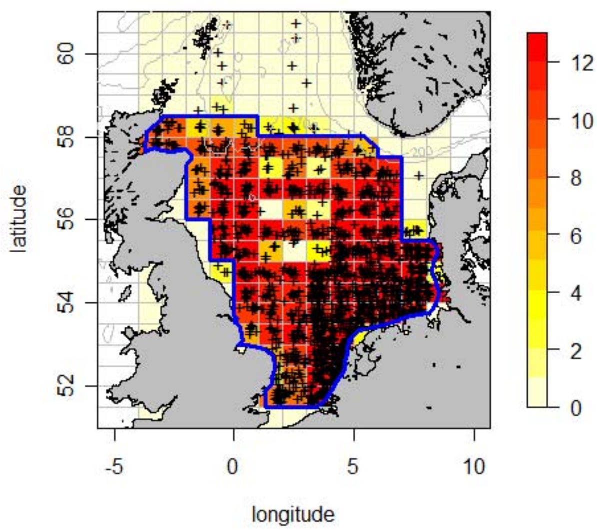


Figure 6.4.4.1 Map of all survey stations (+) during the Tridens and Isis surveys carried out from 1996 to 2008. The blue bold line is the boundaries of the sampled population defined according to the sampling intensity through the 13 surveys considered in the analysis.

A 8 meter beam trawl was used with 8 ticklers, 40 mm mesh in the codend. 120 mm mesh in the net for the Isis survey. The same gear was used for the Tridens survey, but with an additional flip-up rope. Combining the 2 surveys was done with correcting for relative gear efficiency as suggested by the WGBEAM (ICES 2009e). Haul duration was on average 30 min at a towing speed of 4 knots, mainly in daylight. Catch numbers and age were recorded for plaice (*Pleuronectes platessa*). For each station, densities were disaggregated by age and expressed in numbers of fish caught per hour trawled. To compute the spatial indices, we assumed that the swept area per hour of trawling was 0.017 nm²/hour. and densities at age were expressed in numbers per square nautical miles. Age group 1 to 7 were considered for the analysis. Changes in the spatial distribution of the North Sea plaice stock over time can be firstly examined by plotting densities by age group and year. Figure 6.4.4.2 shows plaice densities at age 2 for the last 6 years of the time series (2003-2008).

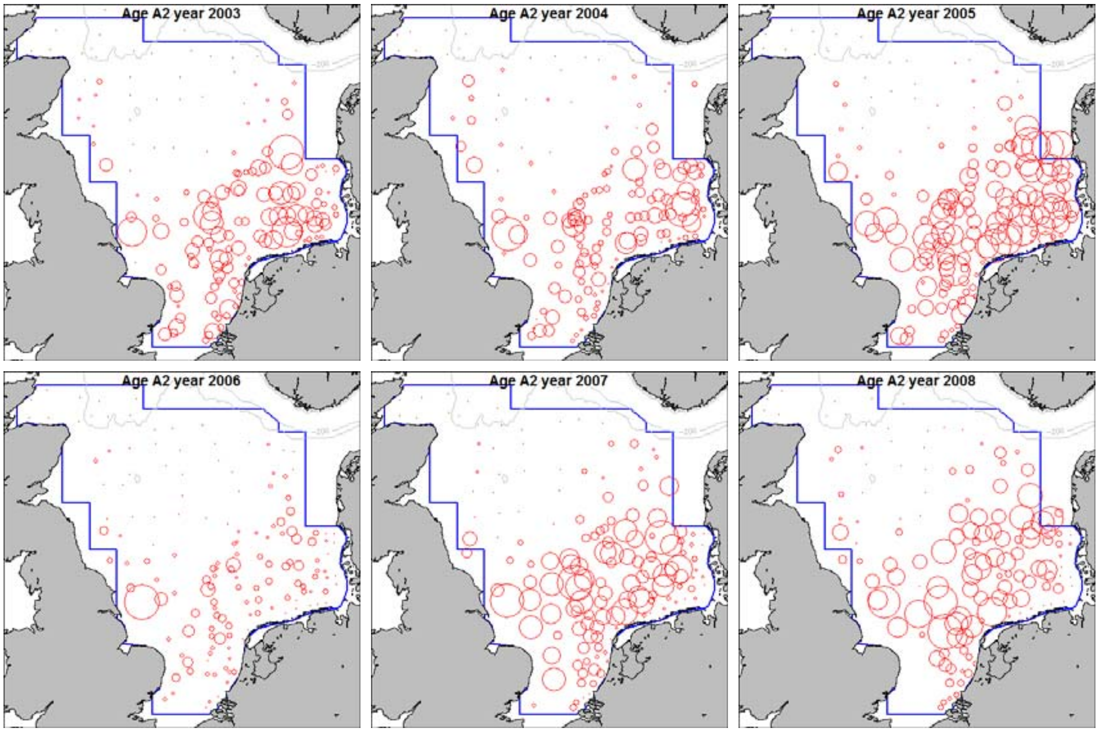


Figure 6.4.4.2 Bubble plots of NS plaice aged 2 densities (N/nm²) found during the combined beam trawl survey Tridens and Isis in 2003-2008. Bubble radius represents the square root of the density scaled to the maximum density of each map (i.e. each year and age). Densities were corrected for relative gear efficiency. The bold line delineates the polygonal domain inside of which data have been considered through the 13 surveys.

NS Plaice Survey Spatial Indices

Selected statistics are chosen to capture spatial patterns of fish populations using fish density data collected during research surveys (Woillez et al., 2007). To handle diffuse population limits, indices are designed not to depend on arbitrary delineation of the domain. They characterize the location (centre of gravity), occupation of space (inertia, isotropy, positive area, spreading area and equivalent area) and microstructure (Table 6.4.4). These spatial indices have the potential to be used in a monitoring system to detect changes in spatial distribution (Woillez et al., 2009).

6.4.5. Input parameters

Spatial indices were calculated using R functions developed at Mines-ParisTech, Centre de Géostatistique. Some of the functions need input parameters which are now given:

(9) Definition of domain: To obtain a series of indices reliable over years, we need to compute spatial indices inside the same polygonal domain (Figure 6.4.4.1) that delineated the sampled area.

(10) Discritisation: The computations for a given year are weighted by areas of influence attributed to each sample for that year, the spatial population being closed by zero-density values, if any, or by the limits of the domain. The area of influence of a sample

location is defined as the area made up of the points in space that are closer to this sample than to others. It can be evaluated by overlying a very fine regular grid and counting grid points closer to the sample. The surveyed domain is finely discretised. here 200 times (parameter *ndisc*).

(11) Max influene of samples: When there are few gaps in sampling, e.g. through bad weather, which might cause a bias in the indices. The influence of each sample was limited to a distance *dlim* = 83 nautical miles in order not to extrapolate its value unduly.

(12) Mean lag between samples: The microstructure index is taken as the relative decrease of the covariogram between distance zero and a distance h0 chosen to represent the mean lag between samples. Here. h_0 = 16 nautical miles.

Table 6.4.5 List of the spatial indices and the population characteristics they are thought to be related to.

Index	Abbrev.	Units or range	Population characteristics
Centre of gravity	*CG*	geographical coordinates	Mean geographic location of the population
Inertia	*I*	square nautical miles	Dispersion of the population around its centre of gravity
Isotropy	*Iso*	[0, 1]	Elongation of the spatial distribution of the population
Positive area	*PA*	square nautical miles	Area of presence occupied by the stock, even with a low density
Spreading area	*SA*	square nautical miles	A measure of the area occupied by the stock that takes into account variations in fish density.
Equivalent area	*EA*	square nautical miles	An individual-based measure of the area occupied by the stock
Microstructure	*Mi*	[0, 1]	The fine-scale variability of the fish density surface

NS Plaice Survey average spatial pattern across ages

The location of the population is summarized by the position of the centre of gravity (CG) for the different age groups over the study period (Figure 6.4.4.3). The CGs of plaice aged 1 were close to each other and extended linearly along the coast of Netherlands. The CGs of plaice aged 2 and above revealed that they were farther Northwest with the age. In contrast, the CGs of the samples (not presented) weighted by their areas of influence (but not by plaice densities) are stable throughout the time-series. Therefore, the differences in location of the CGs between plaice age groups could not be attributed to changes in the sampling design and were interpreted as real spatial shifts. Inside each plaice age group, scattering of the CGs indicates some interannual variability. Scattering was greatest for the oldest plaice group.

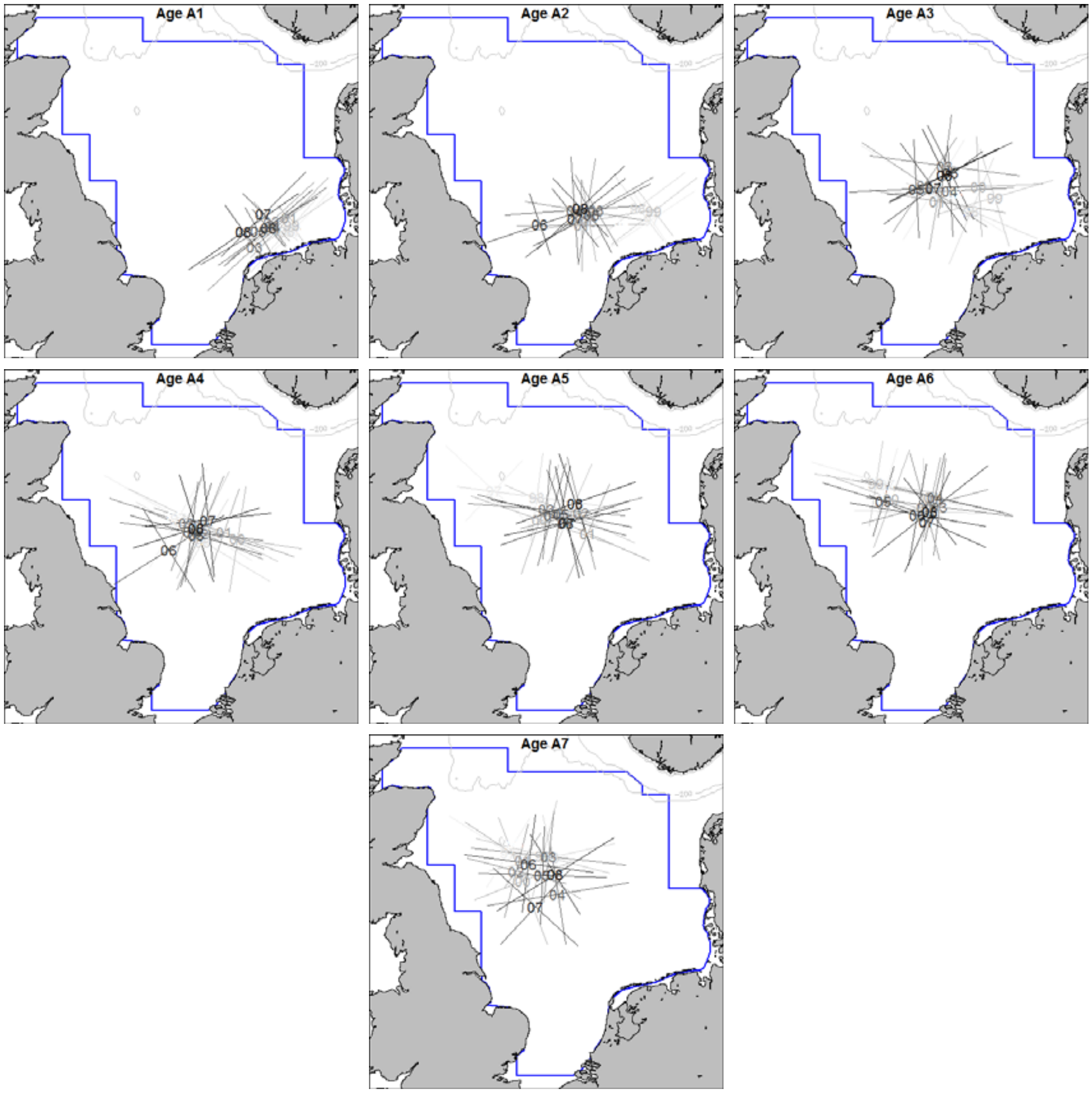


Figure 6.4.4.3 Distribution of the centres of gravity of plaice age groups 1 to 7 computed from 1996 to 2008 (from light grey to dark grey). The bold line delineates the polygonal domain inside of which data have been considered through the 13 surveys.

The inertia of the sampled population increased from age 1 to age 4, then decreased till age 7, indicating a smaller spatial dispersion around the CG for extreme ages (Figure 6.4.4.4). Isotropy increased from age 1 to age 3, stabilized itself till age 7 (Figure 6.4.4.4). The distribution of plaice in the North Sea seemingly has a preferential direction, more marked at age 1. The preferential direction of these age groups (Figure 6.4.4.3) was Southwest-Northeast. It also corresponded to the line of the CGs. For other ages, the population did not present any clear preferential direction of the distribution. The microstructure index was computed using a mean sample lag of 16 nautical miles. In average, it decreased from age 1 to 6, but then rose slightly for age 7 (Figure 6.4.4.4). It demonstrated spatial irregularity of fish density decreasing with age. During the study period, the size of the positive area (the area where plaice were present) increased from age 1 to 3, then decreased till age 7. Spreading area and equivalent area were closely related (Figure 6.4.4.4). They increased in a similar manner from age 1 to 4, and then decreased till age 7. They are showing that age 4 has the better spread in space than the other ages.

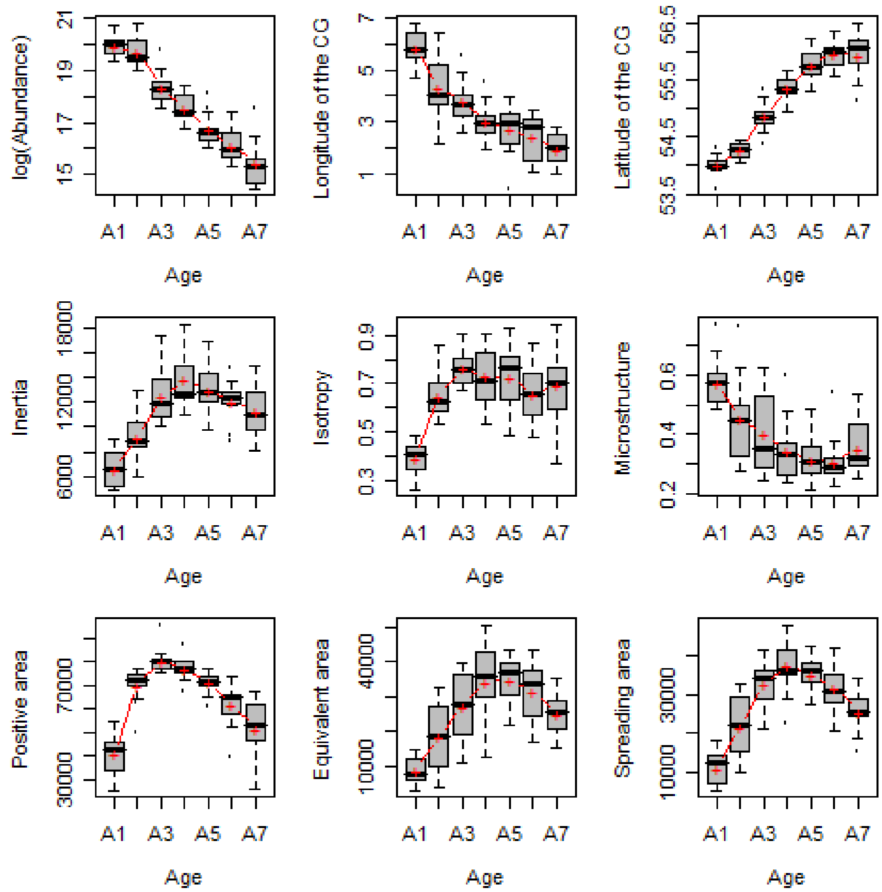


Figure 6.4.4.4 Box plots and means of the spatial indices for age groups 1 to 7. The box stretches from the lower hinge (defined as the 25th percentile or the first quartile Q1) to the upper hinge (defined as the 75th percentile or the third quartile Q3). The median is shown as a line across the box. The mean appears as a red cross. The whiskers extend to the farthest points that are not outliers (i.e. that are within 3/2 times the range between quartiles Q1 and Q3). The extreme values defined as outliers are represented by dots. The means are also linked through the ages.

NS Plaice Survey multivariate spatial indices

Fisheries survey series result in the estimation of spatial indices for the North Sea plaice population (age groups 1 to 7) Annex H. This table of spatial indices constitute a yearly monitoring system with multivariate observations on spatial distribution. The spatial evolution of the population can be represented in the factorial (multivariate) space of the indices (Woillez et al., 2007) and its trajectory can be evaluated to stay or go outside control limits (Petitgas and Poulard, 2009). Multi factor analysis is used to quantify the reproducibility in time of a multivariate structure (indices estimated at age) and a MFA-based distance has been computed. For each age group, the mean position in the factorial space for the reference years is first estimated. Then the distances of each year observation to these age-specific mean positions are computed and normalized by the age-specific variances. Finally, a multivariate spatial index is obtained corresponding to a time series of distance which is for a given year the sum of the elementary distances over ages. The spatial stock evolution can be summarised and monitored with this distance.

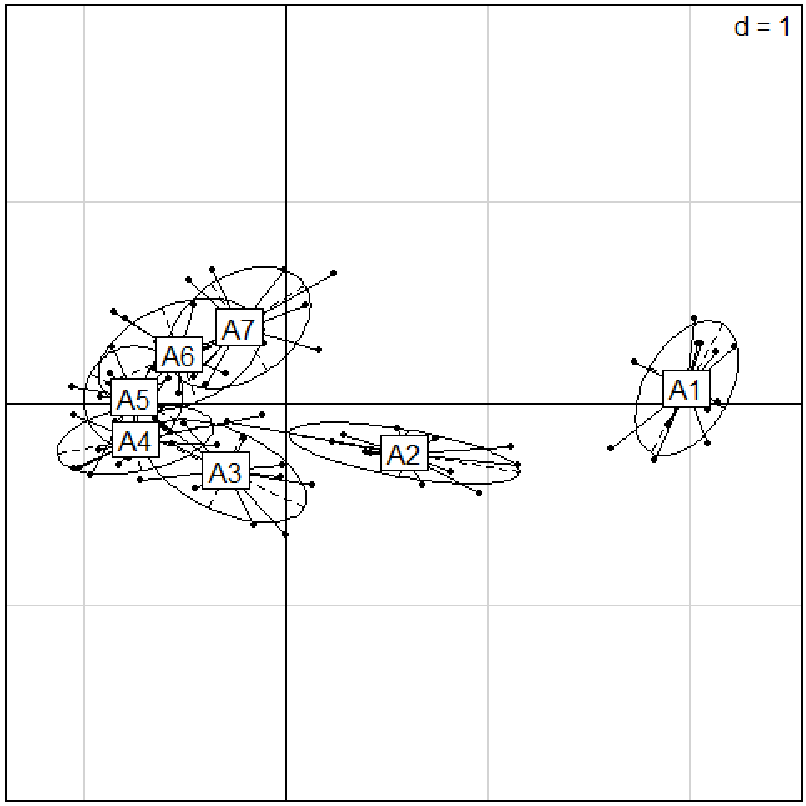


Figure 6.4.4.5 Graphical depiction of the projection of N S plaice age groups on the principal Multiple Factor Analysis (MFA) plane. Labelled squares represent the centres of gravity of plaice age groups observed during 13 surveys. Points indicate the position of the each plaice age group for a given year.

The first two axes of the MFA account for 83% (Figure 6.4.4.5) of the total variance of the data. The high value (11.9) recorded for the first eigenvalue shows that the first MFA factor corresponds to an important direction of variance for each of the years. These two components provide a good representation of the main spatial distribution changes occurring during the plaice life. The correlation between the indices and the axes are summarized in Table 6.4.6. It will be noticed that no index is enough correlated with axis 3 to appear in the Table 6.4.6. The main spatial features of the age groups are summarized Figure 6.4.4.5.

Table 6.4.6 Multiple factor analysis (MFA) of 8 spatial indices describing 7 components (age groups A1 to A7) of the plaice population of the North Sea along 13 surveyed years. Summary of correlations between variables and the first 3 MFA factors: number of correlated surveys (- correlation<-0.4. + correlation>0.4) among the 13 considered.

	Principal axis 1	Principal axis 2	Principal axis 3
Positive area	0+|13-	0+|11-	0+|0-
Equivalent area	0+|12-	0+|0-	0+|1-
Spreading area	0+|13-	0+|0-	0+|0-
Longitude of centre of gravity	13+|0-	0+|2-	1+|0-
Latitude of centre of gravity	0+|13-	7+|0-	0+|0-
Inertia	0+|13-	0+|1-	0+|0-
Isotropy	0+|12-	0+|2-	0+|1-
Microstructure	12+|0-	0+|2-	1+|0-

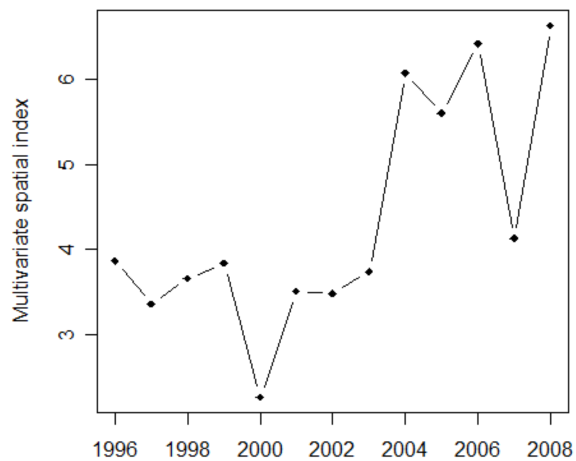


Figure 6.4.4.5 Time series of the multivariate spatial index characterising the evolution of the N S plaice population spatial distribution.

From left to right on axis 1 (see Table 6.4.6), microstructure (evenness of the spatial distribution) and longitude of centre of gravity increase while the indices referring to occupied area (i.e. positive area, spreading area, equivalent area), latitude of the centre of gravity, inertia and isotropy (spatial distribution not homogeneous in all directions) decrease.

From top to bottom on axis 2, latitude of the centre of gravity decreases while positive area increases. Positive area is negatively correlated with both axes 1 and 2. Latitude of the centre of gravity is negatively correlated to axis 1 and positively to axis 2. The other indices are more specifically correlated to one axis only.

The Figure 6.4.4.5 illustrated the spatial life cycle of the sampled plaice population. Age 1 is the most east, with density surface strongly irregular (microstructure) and small spread (occupation areas). Then, with the age, plaice moved northwest, and presented its maximal spread with no preferential direction and maximal dispersion for age 4. It will be noticed that distribution of age 3 to 7 overlap, meaning that spatial distribution characteristics are changing progressively with the age (overlap).

The multivariate spatial index has been computed based on the reference years (here 1996-2003). These years have been chosen according to fishing mortality level (high and stable). Figure 6.4.4.5 showed 2 periods; Low values before 2004 are followed by higher ones.

NS Plaice Survey selection of raw informative indices

Though principal components and multivariate indices are efficient in summarizing the multivariate spatial evolution of the population, it is useful to select raw indices to explicitly interpret the changes that have occurred.

The selection of only those indices most correlated to the principal components could suffice to summarize the evolution of the spatial indices. But this procedure is not necessarily satisfactory as some of the selected indices can show little continuity in their time series and are therefore difficult to interpret.

In the analysis above, correlation between indices characterised whether the indices fluctuated together or in opposition or without relationship. But continuity along the time series was not considered at all. Continuity is important for characterising the evolution of the spatial distribution in time. The MAF method (Min/Max Autocorrelation Factors) was used here as an automated procedure to select those indices that best summarise the multivariate information on the stock with highest continuity in time (Woillez et al., 2009b). The MAF method allowed constructing principal components (factors), the autocorrelation of which decreases from the first factors to the last ones. Hence the very first factors (MAFs) extract the part of the multivariate information which is the most continuous in time. Therefore, we used the MAF method to select those indices that showed highest continuity in time as well as being the most correlated to the first MAF.

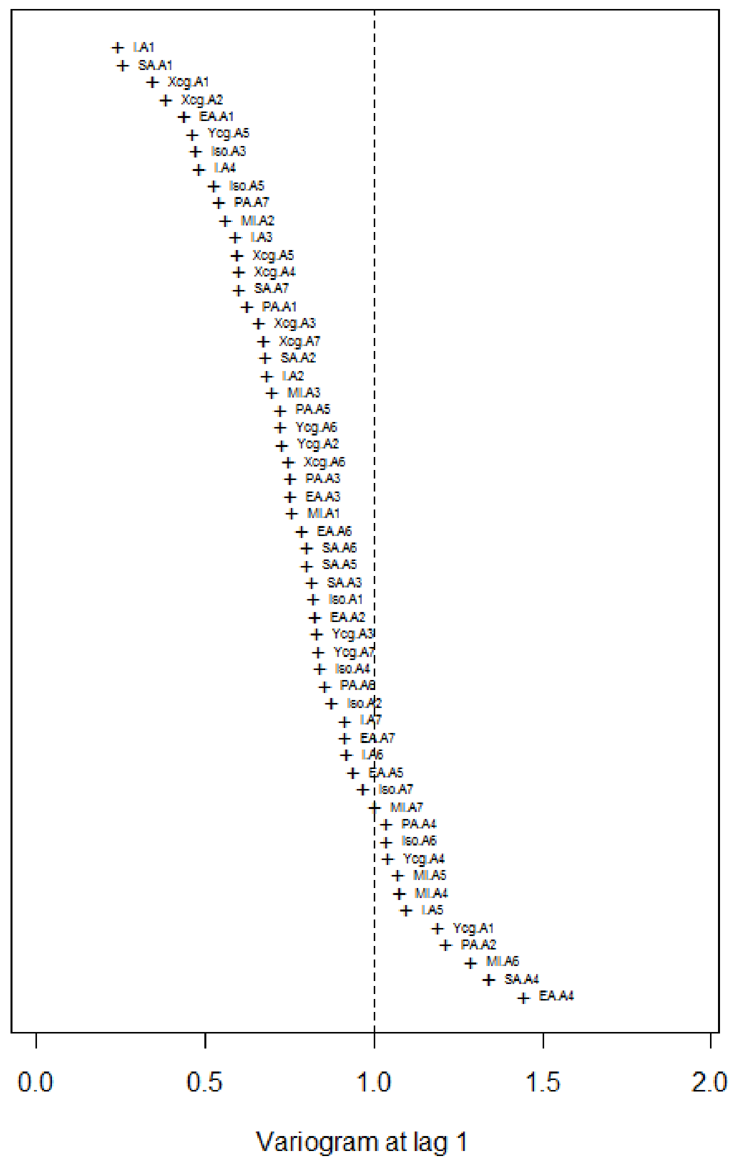


Figure 6.4.4.7 Plot representing the spatial indices describing the North Sea plaice stock, ordered according to their time continuity for the period 1996-2008.

The full set of indices comprised 56 spatial indices for the 7 age groups. All indices were ranked in ascending order of their variogram value at lag 1 year (Figure 6.4.4.7). To construct the MAFs, only those indices were retained which had a variogram value at lag 1 lower than 0.542 (10 indices). The number of years in the time series is 13: there are more observations than the number of variable to construct the MAFs. Nevertheless, a procedure was used to robustify the estimation of the MAFs by adding white noise to each index (Figure 6.4.4.8).

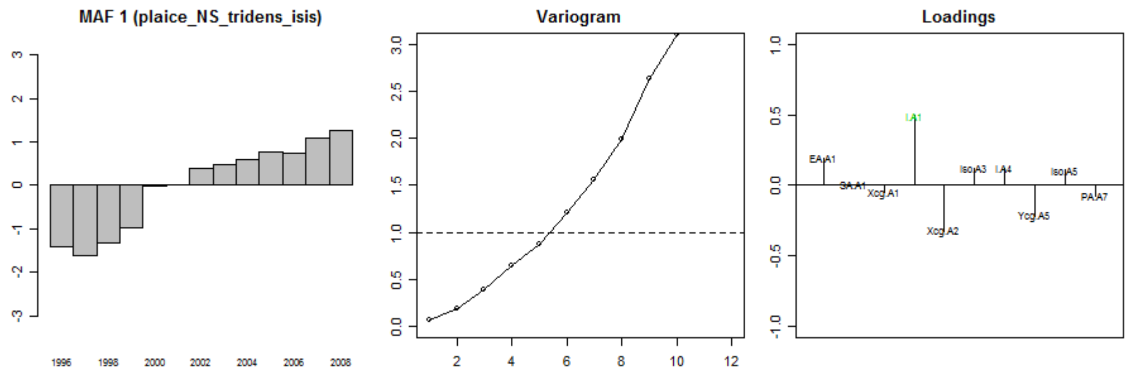


Figure 6.4.4.8 Time series of the first MAF, its correspoding variogram and loadings associated to each indicators for the North Sea plaice.

Then the indices with highest continuity were selected based on their loadings and the variogram of the MAFs. Here we considered the first MAF to rank the indicators in descending order of their continuity and the 6 most continuous were selected to represent the evolution in time of the spatial distribution (Figure 6.4.4.9). These indicators are the inertia at age 1, the longitude of the centre of gravity at age 2, the latitude of the centre of gravity at age 5, the equivalent area at age 1, the inertia at age 4 and the isotropy at age 3. By construction, these are the most continuous in time as well as the most correlated to the multivariate structure of all indicators. They should thus allow interpretation of the changes detected using the multivariate spatial indicator.

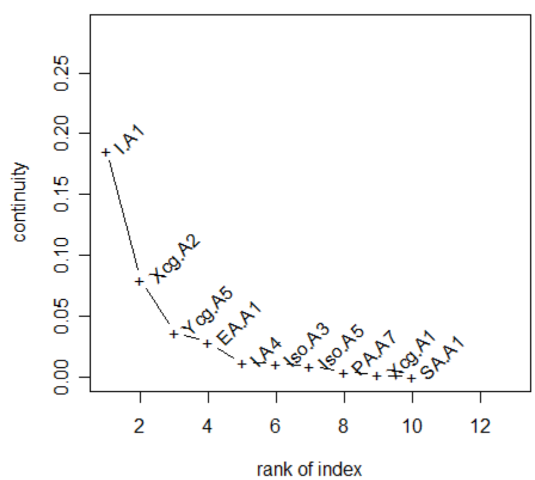


Figure 6.4.4.9 Indices ranked according to their continuity on the first MAF for N S plaice.

NS Plaice Survey detection of changes in the spatial distribution

A decision interval CUSUM monitoring scheme was applied to the multivariate spatial indicator (Figure 6.4.4.10) in order to detect those years in which the stock departed from its reference (Mesnil and Petitgas, 2009). A similar procedure was also applied to the 6 indicators that were used to assist the interpretation. Then, a table of CUSUM out-of-control deviations is constructed to serve as a diagnostics table (Petitgas, 2009). In this table, the deviations in the different indicators are quantitative and given in similar units of variance, which facilitates their integrated assessment. The CUSUM out-of-control table also shows how deviations repeat over time and thus provides a view of the history of spatial changes.

Reference years were set to 1996-2003: a period where the fishing mortality was stable and at high level. CUSUMs are tuned so as to present large in-control average run length, meaning that the risk of false alarm is low, and small out-of-control average run length (2 years and lower) meaning that a significant change is rapidly detected (Table 6.4.7)

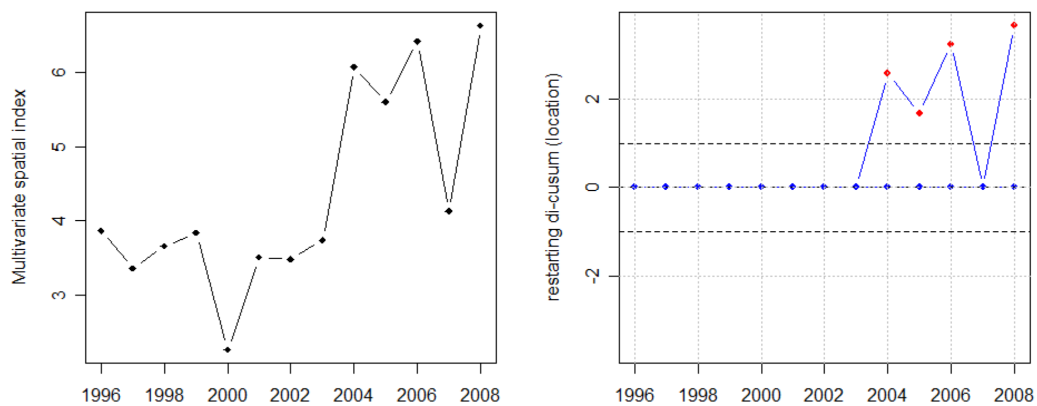


Figure 6.4.4.10 Time series of the multivariate spatial indicator and its corresponding decision-interval CUSUM control chart to achieve its monitoring. The values above the threshold indicate an out-of-control state (red dots) The detection is achieved with an average false alarm rate of 0.0003 and an alarm detection time of 1.1 years. The parameters of the CUSUM scheme are k = 2.48 (allowance) and h = 1 (decision interval). Reference years were set to 1996-2003.

Table 6.4.7 CUSUM diagnostics table for North Sea plaice using spatial population indicators. Values are the out-of-control deviations from the reference mean for each indicator in standard deviation units. The reference period is 1996-2003. The procedure signals an alarm in 2004-2006, 2008. Multivariate indicator leads the diagnostics, while univariate indicators assist the interpretation. CG is the abbreviation of centre of gravity.

Year	Multivariate spatial	Inertia	Longitude of CG	Latitude of CG	Equivalent area	Inertia	Isotropy	Diagnostic
	Total	age 1	age 2	age 5	age 1	age 4	age 3	
1996	0	0	0	0	0	0	0	Ref
1997	0	0	0	0	0	0	0	Ref
1998	0	0	0	0	0	0	0	Ref
1999	0	0	0	0	0	0	0	Ref
2000	0	0	0	0	0	0	0	Ref
2001	0	0	0	0	0	0	0	Ref
2002	0	0	0	0	0	0	0	Ref
2003	0	0	0	0	0	0	0	Ref
2004	2.56	2.13	0	0	0	0	0	Alarm
2005	1.66	1.62	0	0	0	0	0	Alarm
2006	3.23	0	-2.63	0	0	0	0	Alarm
2007	0	0	0	0	0	-0.90	1.70	-
2008	3.65	2.33	0	0	1.10	0	0	Alarm

Table 6.4.8 Parameters of the CUSUM monitoring schemes for North Sea plaice spatial indicators. The reference period is 1996-2003. Parameters are: mean (mu) and standard deviation (sd) in the reference period; allowance (k in sd units); decision interval (h in sd units); average run length (ic.arl. time in years) of the CUSUM to a false alarm (also noted ARL(0)); run length (ic.rl.25. in years) of the CUSUM corresponding to the first quartile of the run length distribution; average run length (oc.arl. in years) of the CUSUM to detect a shift in the mean after it has happened (also noted ARL(2k)). XCG is the abbreviation of the longitude of the centre of gravity, YCG the latitude of the centre of gravity and EA the equivalent area.

Parameters		Multivariate spatial	Inertia at age 1	XCG at age 2	YCG at age 5	EA at age 1	Inertia at age 1	Isotropy at age 3
Mean	mu	3.47	5774.63	4.95	55.80	6898.00	14986.13	0.74
Standard deviation	sd	0.52	1005.47	1.12	0.29	3570.87	2439.74	0.06
Allowance	k	2.48	1.18	0.78	0.80	1.30	1.00	0.80
Decision interval	h	1.00	1.00	1.00	1.00	0.60	0.80	1.00
In-control average run length	ic.arl	3914.3	56.8	20.6	21.6	32.9	24.3	21.6
In-control run length (1st Qt.)	ic.rl.25	999.0	16.0	6.0	6.0	9.0	7.0	6.0
Out-of-control average run length	oc.arl	1.10	1.60	2.10	2.00	1.30	1.60	2.00

North Sea plaice stock has experienced a clear change in its spatial distribution for 4 years. 2004-2006, 2008. Looking to the time series of the indicator selected to assist the diagnostic is in favour of a persisting change in the spatial distribution of the North Sea plaice stock (Figure 6.4.4.11). The dispersion of plaice at age 1 around the centre of gravity have increased over the period (inertia). The plaice aged 2 have shifted towards the West (centre of gravity).

Plaice age 1 group showed a better spread in the recent years (equivalent area), while the dispersion of age 4 have decreased (inertia).

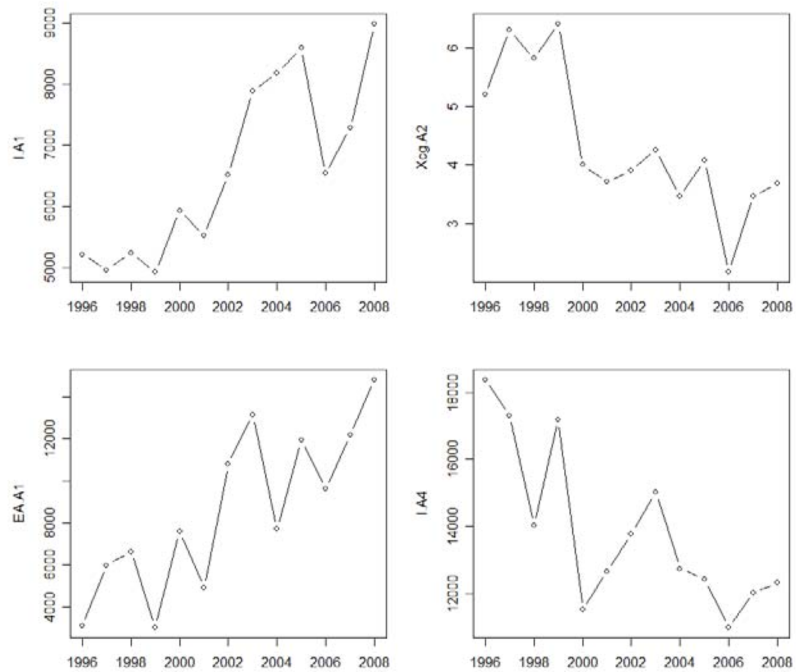


Figure 6.4.4.11 Time series of informative raw indicators that have signalled years that departed from the reference period. These indicators are the inertia at age 1 (I.A1), the longitude of the centre of gravity at age 2 (XCG.A2), the equivalent area at age 1 (EA.A1) and the inertia at age 4 (I.A4).

6.4.5. Biological sustainability of the plan to 2015

The multiannual plan for North Sea plaice and sole was assessed in an *ex ante* evaluation of 200 simulated stocks from 2009 to 2015. The initial states of all of the stocks up to and including 2008 were taken from the most recent ICES assessments of North Sea sole and plaice without uncertainty. Recruitment for 2009 onwards was based on the observed geometric mean from 1957 to 2008 with variance added by resampling (with replacement) residuals from the historic period. As the stocks remain above B_{LIM} reduced recruitment at low biomass is not required. The simulation included observation error on landings (CV=0.1), discards (CV=0.35) and surveys (for each index of each species, based on the historic distribution of the index residuals from the XSA). Each year an XSA assessment using the current ICES settings was conducted to obtain a perceived view of the population. The TACs for each species were set each year according to a harvest control rule (HCR) based on the multiannual plan for each species. The HCR was applied to the perceived view of the population. The F value to be applied was chosen as the maximum of a 10% reduction on F_{sq} or the target F value (F_{MSY} proxy). A maximum TAC change limit of 15% was applied. No implementation error was considered (i.e. the TACs were caught exactly). No fleet dynamics or effort constraints were considered in the simulations.

The results of the *ex ante* evaluation for the North Sea plaice stock are presented in Figure 6.4.5.1. The stock was considered to be above B_{PA} at the start of the simulations with F below the target F. In these simulations plaice spawner stock biomass is shown to remain above B_{PA} with a greater than 95% certainty, for the duration of the simulations, increasing until 2014 when it begins to level off at a median value around 600 000t. SSB is shown to remain above B_{LIM} with substantially greater than 95% probability. This rise in spawner biomass is accompanied by a rise in fishing mortality. The XSA used to assess the stock each year incorporates shrinkage in F over the last five years, hence the increase in F on the true population is underestimated slightly resulting in a slight overestimation of SSB. This leads to TACs being set that correspond to a higher F than the target value towards the end of the simulation period. Yields are predicted to increase over the whole period. For most years TACs increase by the maximum allowable amount (15%) with a high probability but after 2012 the mean TAC increase is less than 15% as the population starts to level off.

The results of the *ex ante* evaluation for the North Sea sole stock are presented in Figure 6.4.5.2. The stock was considered to be above B_{PA} at the start of the simulations but F was still above the target F. In these simulations sole spawner stock biomass is shown to remain above B_{PA} with approximately 80% certainty for the duration of the simulations, in most cases increasing slowly over the duration of the simulations to a median value around 60 000t. SSB is shown to remain above B_{LIM} with 95% probability. Fishing mortality is expected to decrease over this period, but will only reach the target value with a probability of just over 25%. Yields are predicted to remain relatively stable, increasing slightly towards 2015. For most years TACs increase by approximately 5% on average.

The results of this *ex ante* evaluation suggest that for both stocks the multiannual plan can be considered sustainable to 2015. The plan is likely to prevent SSB of both stocks from falling below the precautionary limit. The observation and model error used in applying the HCR results in plaice F being above the target level in 2015 but as the stock levels off an TACs start to drop F should begin to move toward the target F. Sole fishing mortality does not reach the target F level, but is forecast to decline steadily towards it up to 2015. The results are conditional on the assumptions of the simulation. The probability of SSB being below B_{PA} in the first few years (2008 on) is underestimated as the uncertainty in the first assessment is not taken into account. Misreported landings, changes in fishery selectivity or the interaction between fisheries could all affect the catches of sole or plaice, potentially impacting on the risk of being below B_{LIM} in the long term.

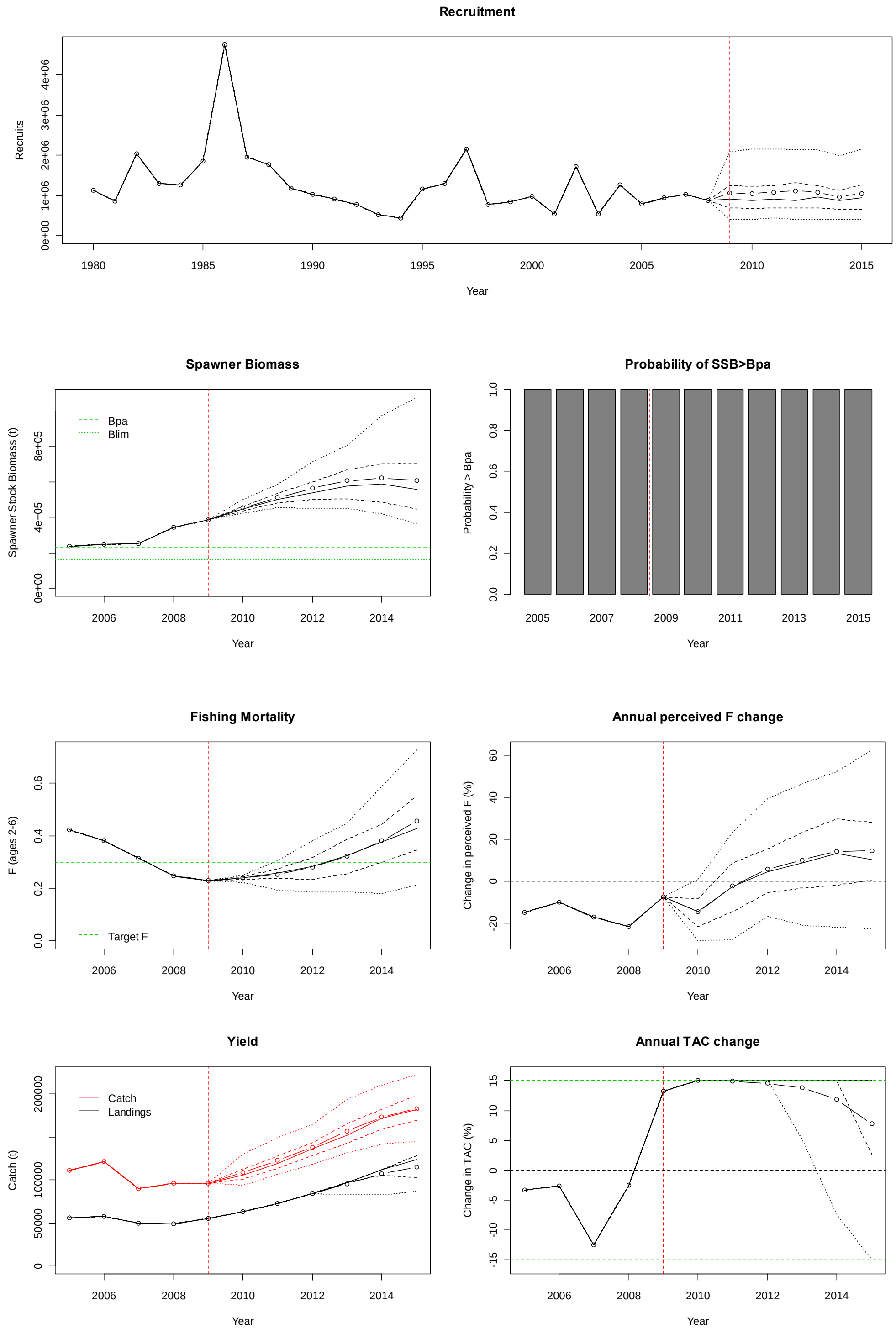


Figure 6.4.5.1. Results of the management procedure simulations for the North Sea plaice stock to 2015. *N*=200, plotted are: the median (solid line), the mean (circles), 25-75 percentiles (dashed lines) and 5-95 percentiles (dotted lines). The horizontal red line represents the start of the simulations.

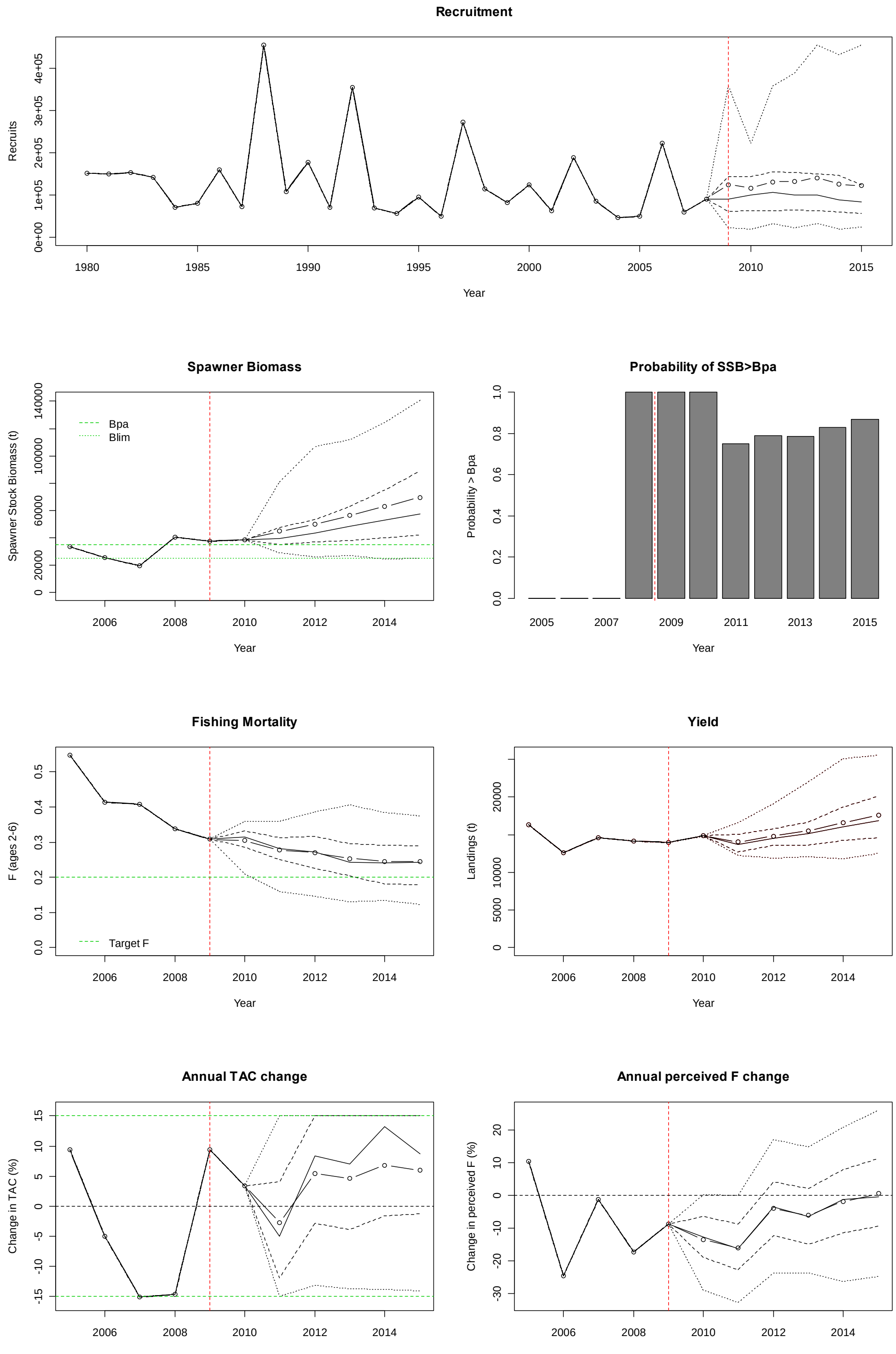


Figure 6.4.5.2. Results of the management procedure simulations for the North Sea sole stock to 2015. *N*=200, plotted are: the median (solid line), the mean (circles), 25-75 percentiles (dashed lines) and 5-95 percentiles (dotted lines). The horizontal red line represents the start of the simulations.

6.4.6. Evaluation of the effects of the multi-annual plan on the ecosystem.

There was no data available to evaluate the extent of the impact of this multi-annual plan on the ecosystem.

In terms of multispecies impacts, ICES estimates of discard levels of North Sea plaice from the North Sea mixed fishery are available. Discard estimates are highly variable from year to year (Fig. 6.4.4.1) . As a result, there is no clear trend in quantity or proportionality of discards to landings over the recent period. While there is an increase in discards in the first year of implementation of the multi-annual plan, the degree of uncertainty on these estimates makes it difficult to draw any firm conclusions on the significance of this or to attribute this in any way to the implementation of the multi-annual plan. While absolute discarding levels have declined over 6 or 7 years, and currently they are near the lowest level of the past ten years they remain a similar proportion of the landings (Fig 6.4.6.1).

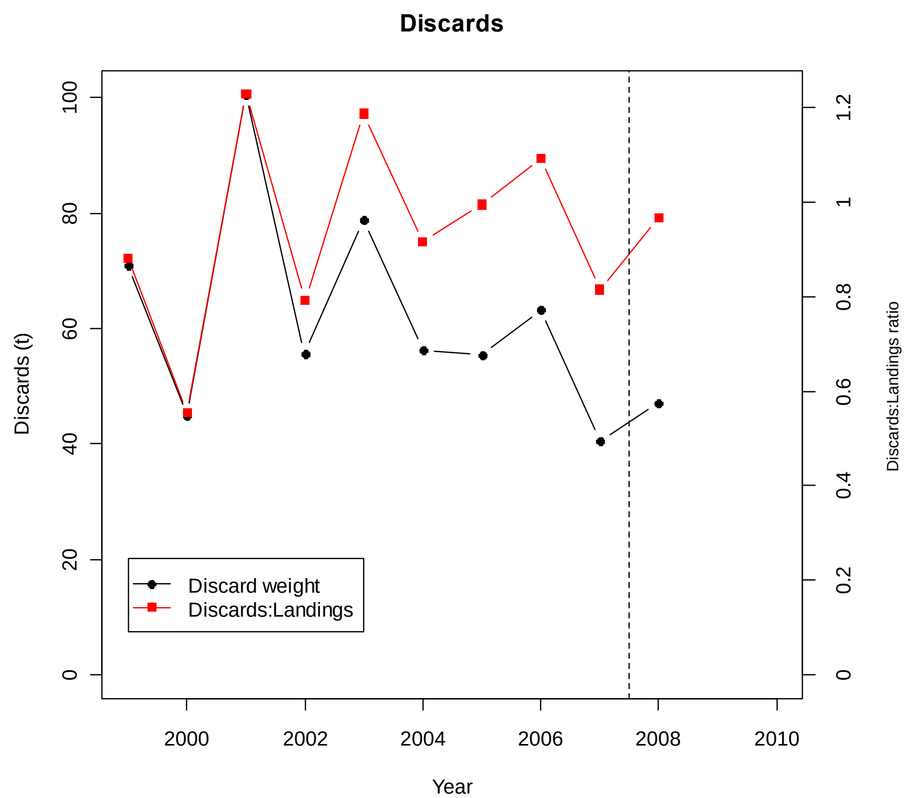


Figure 6.4.6.1 Recent ICES estimates of North Sea plaice discards (black line, left axis from Fig 6.4.4.1) and the discard to landings ratio (red line, right axis).

6.5. Social and Economic Effects of the Plan

6.5.1. General comments on socio-economic evaluation of multi-annual plans

This section gives an overview of the economic aspects of multi-annual plans in general, it should be read also with respect to sections 4.5 and 5.5 economic and social, effects of plans for Bay of Biscay and Western channel sole stocks.

The implementation of long term multi-annual plans (LTMP) as a basic instrument in the CFP is from an economic standpoint a substantial improvement. So far the management system is dominated by a very short term setting of fishing opportunities and technical measures. However, fishermen must plan financial operations like investments at least over a period of 5 to 10 years, or in the case of an investment in a new vessel over 20 to 30 years. LTMP are not guaranteeing predictability of fishing opportunities over such periods but they do provide some kind of certainty as to the procedure under which the TAC and fishing effort (days at sea) will be set over the coming years. Many plans include a 15% constraint in annual quota changes as an economic instrument. This was introduced in part to allow for easier adjustments on the fish markets to prevent huge price differences. However, as the low prices during the economic crisis 2008/2009 show there are many other influences on prices besides catch levels.

The main economic argument in favour of a LTMP (and recovery plans) is that long term gains would be higher than short term losses at the beginning of the recovery period. With a calculation of the present value of future gains and losses it could be possible to draw some general conclusions on a possible economic feasibility of a plan (see Döring and Egelkraut 2008 for Baltic Sea cod as an example). However, in the case of fisheries and the current short term management system, discount rates are quite high. A high discount rate means that fishermen strongly prefer short term over long term gains. Research in discount rates in fisheries identified rates above 20% (Hillis & Wheelan 1994). In this case fishermen prefer to go on with today's over-fishing scenario instead of investing in the stock by reducing catches for some time to allow for a recovery.

In the past STECF conducted a few impact assessments (IAs) with the aim of showing possible economic consequences of certain management strategies. It is obvious that a present value calculation over a longer time period with a weighing of short term losses vs. long term gains is a pure model calculation of an uncertain future. Nevertheless, in the impact assessment (IA) of the LTMP for sole and plaice in the North Sea (STECF 2007) such an approach was taken at least for a period up to 2015. This is still a very short period compared to an investment period in fisheries. Nevertheless it was a good first approach to show the economic feasibility of a LTMP. Some results of this IA are included in this report to compare with the results with the real development in the sole and plaice fishery following implementation.

The request for the economists at the SGMOS 0902 meeting was to evaluate the real development, therefore focussing on the short term development and perspective in some fleet segments. The main problem is that in the case of the agreed multi-annual plans no specific socio-economic objectives were included in the plans and the evaluation has to be against the basic objectives of the CFP. These objectives are:

- Sustainable economic, environmental and social conditions

- Efficient fishing activities
- Economic viable and competitive fisheries
- Fair living standard of fishermen

From an economic perspective it is possible that these objectives cannot all be achievable at the same time. Basically, efficient fishing activities mean to be profitable and earn interest on the invested capital similar to other sectors of the economy (so that it is not optimal to invest the capital somewhere else). It is obvious that to achieve such an objective may imply huge changes in the fishing fleets which may contradict social objectives such as keeping as much employment as possible in the fleet or in a certain region. Because of the lack of specific objectives it is, therefore, not possible to draw conclusions if these general objectives are achieved by the plan.

For this evaluation economic data up to 2007 was available from every country. The plan for North Sea sole and plaice and the plan for the western channel sole fishery has been implemented in 2008, the plan on sole in Bay of Biscay 2007. From a few fleet segments some data was available for 2008. It is obvious that it is impossible to draw conclusions on effects of a plan having data only for one year into a plan and only for a limited number of involved fleet segments. It is necessary to split data between areas and segments if a country's fleet operates in several areas. For the two plans, Bay of Biscay and Western Channel sole, the WG was not able to assess if the available data covers the basic fleet segments targeting these stocks because there was no economic expert present at the meeting having deeper knowledge of these fisheries. The experts present were not able to split the economic data between areas and stocks especially for these two sole plans.

Additionally, it was not possible to give a forecast up to 2015 because of the lack of time, data and knowledge to run the EIAA-model for such a long period.

There was a specific problem to separate effects of the plan from other influences on the operations of the fleets. Therefore, we included qualitative descriptions with the presentation of the available indicators (from the AER up to 2009 and the 2008 data: STECF 2009a) as far as possible.

In the case of the North Sea sole and plaice plan we include the results of the Impact assessment (STECF 2006) to show the prediction before the implementation of the plan. In the IA a baseline was calculated which can be seen as a 'no multi-annual plan' scenario.

In this SGMOS report the 'no multi-annual plan' scenario is different from the baseline scenario in the IA. However, a comparison of the results together with an analysis of the real situation 2008 may give an indication what was predicted at the time of implementation and what are effects observable after one year of implementation. Nevertheless, it is obvious that other effects are much more relevant for changing fleet behaviour than the Multi-annual plans (fuel costs, fish prices, etc.).

6.5.2. Data and Indicators

The annual economic indicators by fleet segment are given below for segments catching significant quantities of plaice and sole in the North Sea.

Table 6.5.1 Economic indicators by year (2006 to 2008) for Belgium Beam trawler fleet TBB12-24 and TBB24-40

		0	TBB 1224		
	mln	2006	2007	2008	3yr aver.
	Euro				
	Value of landings	17,86	14,88	15,70	16,1
	Fuel costs	4	3	4	3,4
	Other running costs	2,99	2,15	3,21	2,8
	Vessel costs	1,21	1,01	1,08	1,1
	Crew share	4,39	3,59	4,12	4,0
	Gross cash flow	5,73	5,39	3,4	4,8
	Depreciation	0,93	0,62	0,70	0,8
	Interest	0,0	0,0	0,0	0,0
	Net profit	4,80	4,77	2,71	4,1
	Gross value added	10,13	8,98	7,54	8,9
*	Invested capital	27,17	27,17	24	26,1
*	Required cash flow	0,9	0,6	0,7	0,8
*	Break-even revenue	2,9	1,7	3,2	2,5

		0	TBB 2440		
	mln	2006	2007	2008	3yr aver.
	Euro				
	Value of landings	22,69	20,20	19,73	20,9
	Fuel costs	9,97	7,09	9,87	9,0
	Other running costs	5,6	4,2	5,5	5,1
	Vessel costs	2,0	1,4	1,6	1,7
	Crew share	9,5	6,8	7,2	7,8
	Gross cash flow	-4,4	0,7	-4,5	-2,7
	Depreciation	1,2	3,67	3,03	2,6
	Interest	0,0	0,0	0,0	0,0
	Net profit	-5,6	-3,0	-7,5	-5,4
	Gross value added	5,1	7,5	2,8	5,1
	Invested capital	50,1	50,1	44,8	48,4
	Required cash flow	1,2	3,7	3,0	2,6
	Break-even revenue	-6,4	110,2	-13,4	-20,3

These two segments are comparable to the Dutch beam trawlers, see below.

Denmark

Only three fleet segments (DTS 1224, PGP 0012, MGP 0012) are targeting plaice and sole in a substantial amount. However, all three segments are not dependent on these landings (10% or much less).

Table 6.5.2a Preliminary Economic indicators by year (2006 to 2008) for Netherlands beam trawlers TBB12-24m

TBB 1224				
mln Euro	2006	2007	2008	3yr aver.
Value of landings	58,37	64,38	65,2	62,65
Fuel costs	13,01	10,84	13,9	12,58
Other running costs	9,99	8,9	10,7	9,86
Vessel costs	9,44	8,6	9	9,01
Crew share	19,77	22,89	21,8	21,49
Gross cash flow	6,16	13,2	9,8	9,70
Depreciation	9,81	8,46	8,7	8,99
Interest	0,0	0,0	0,0	0,00
Net profit	-3,65	4,69	1,10	0,71
Gross value added	25,93	36,04	31,60	31,19
Invested capital	46,49	9,1	9,1	21,56
Required cash flow	9,8	8,5	8,7	9,0
Break-even revenue	93,0	41,4	57,9	64,1

Table 6.5.2b Preliminary Economic indicators by year (2006 to 2008) for Netherlands beam trawlers TBB24-40m

TBB 2440				
mln Euro	2006	2007	2008	3yr aver.
Value of landings	46,57	43,41	33,4	41,13
Fuel costs	19,45	15,64	13,4	16,16
Other running costs	7,0	6,7	5,2	6,29
Vessel costs	4,63	4,33	3,4	4,12
Crew share	10,45	10,3	7,4	9,38
Gross cash flow	5,0	6,5	4,0	5,2
Depreciation	7,73	6,7	4,8	6,40
Interest	0,0	0,0	0,0	0,00
Net profit	-2,7	-0,2	-0,8	-1,23
Gross value added	15,5	16,8	11,4	14,55
Invested capital	14,55	13,4	13,4	13,8
Required cash flow	7,7	6,7	4,8	6,4
Break-even revenue	71,6	44,7	40,1	52,1

Table 6.5.2c Preliminary Economic indicators by year (2006 to 2008) for Netherlands beam trawlers TBB >40m

	TBB 40+			
mln Euro	2006	2007	2008	3yr aver.
Value of landings	131,31	131,85	105,5	122,89
Fuel costs	59,17	53,13	46,9	53,07
Other running costs	19,44	6,66	16,3	14,13
Vessel costs	12,09	11,97	9,6	11,22
Crew share	26,87	28,07	20,5	25,15
Gross cash flow	13,7	32,0	12,2	19,3
Depreciation	19,4	18,6	15,5	17,83
Interest	0,0	0,0	0,0	0,00
Net profit	-5,6	13,4	-3,3	1,49
Gross value added	40,6	60,1	32,7	44,47
Invested capital	87,4	87,4	87,4	87,4
Required cash flow	19,4	18,6	15,5	17,8
Break-even revenue	184,9	76,8	134,0	131,9

Table 6.5.2d Preliminary Economic indicators by year (2006 to 2008) for demersal trawlers DTS 12-24m

	DTS 1224			
mln Euro	2006	2007	2008	3yr aver.
Value of landings	4,48	5,39	6,6	5,49
Fuel costs	1,04	0,92	1,5	1,15
Other running costs	0,77	0,77	1,1	0,88
Vessel costs	0,73	0,71	0,9	0,78
Crew share	1,51	1,9	2,2	1,87
Gross cash flow	0,43	1,1	0,9	0,8
Depreciation	0,78	0,74	0,8	0,77
Interest	0,0	0,0	0,0	0,00
Net profit	-0,35	0,35	0,35	0,12
Gross value added	1,94	2,99	2,99	2,64
Invested capital	5,41	4,0		4,7
Required cash flow	0,8	0,7	0,8	0,8
Break-even revenue	8,1	3,7	5,9	5,9

Observations: Preliminary data for 2008 was used at the meeting. The smaller beamtrawlers were profitable in 2008 mainly because they target shrimp which was highly profitable in 2008 due to a favourable price. The larger beamtrawlers made a net loss in 2008 due to the high fuel costs.

Table 6.5.3 Economic indicators by year (2005 to 2007) for UK beam trawler fleet TBB24-40 and TBB40+

		0	TBB 2440		
	mln	2005	2006	2007	3yr aver.
	Euro				
	Value of landings	25,6	26,7	29,6	27,3
	Fuel costs	7,0	7,4	7,1	7,2
	Other running costs	8,1	7,8	9,1	8,3
	Vessel costs	2,9	1,3	3,4	2,5
	Crew share	6,1	5,0	9,2	6,8
	Gross cash flow	1,52	5,2	0,8	2,5
	Depreciation	1,9	1,7	1,6	1,7
	Interest	0,0	0,0	0,0	0,0
	Net profit	-0,33	3,52	-0,4	0,9
	Gross value added	7,67	10,16	10,5	9,4
*	Invested capital	25,0	54,4	40,4	39,9
*	Required cash flow	1,9	1,7	1,6	1,7
*	Break-even revenue	31,2	8,6	59,1	18,7

	0	TBB 40+		
mln	2005	2006	2007	3yr aver.
Euro				
Value of landings	24,25	24,89	22,04	23,7
Fuel costs	13,34	13,08	8,88	11,8
Other running costs	5,4	7,2	10,2	7,6
Vessel costs	2,85	1,4	0,97	1,7
Crew share	4,29	3,14	6,87	4,8
Gross cash flow	-1,6	0,1	-4,9	-2,1
Depreciation	4,85	4,48	6,78	5,4
Interest	0,0	0,0	0,0	0,0
Net profit	-6,5	-4,4	-11,6	-7,5
Gross value added	2,7	3,2	2,0	2,6
Invested capital	30,9	52,5	45,3	42,9
Required cash flow	4,9	4,5	6,8	5,4
Break-even revenue	-72,2	1858,5	-30,7	-59,4

Observations: For the UK data for 2008 was not available at the time of the meeting. Data up to 2007 suggest that fuel costs were an issue before implementation of the plan.

6.5.3. Unforeseen economic changes

Higher fuel prices in 2008 compare to 2005-2007

As the fuel cost represents a large part of the total variable cost, the fuel price greatly affected the economic performance of the beam trawl segments in 2008. In 2008 the average fuel price increased by almost 35% compared to 2007. Table 6.5.4 shows the dependency on fuel costs of the Dutch beamtrawl segments. In 2008 both the smaller beamtrawlers (24 to 40m) and the larger beamtrawlers (>40 m) spend more than 50% of their total variable cost on fuel. Due to the high fuel price measures were taken to reduce fuel consumption. They use less fuel per sea-day, indicating that they steam less and are fishing closer to port and the reduced engine power resulting in lower kW per vessel on average. Some of the vessels changed gear (for part of the year). Several of the larger beam trawlers have not fished or fished very little during part of the summer due to the high fuel price.

Table 6.5.4 Trends in Fuel consumption Dutch beam trawl segments 2002-2008

	Fuel price per liter	% fuel cost in total variable cost		Fuel consumption liter / seadays		Fuel consumption liter / vessel		Average kW / vessel	
		TBB	TBB	TBB	TBB	TBB	TBB	TBB	TBB
		VL2440	VL40XX	VL2440	VL40XX	VL2440	VL40XX	VL2440	VL40XX
2002	0.20	33.85	38.18	6 014	9 729	836 807	1 649 254	893	1 755
2003	0.21	33.08	36.91	5 607	8 967	913 112	1 659 626	898	1 718
2004	0.24	38.55	41.41	6 180	8 968	931 596	1 509 138	960	1 697
2005	0.36	49.79	54.43	6 155	8 331	939 305	1 508 889	924	1 677
2006	0.41	50.12	53.27	6 071	8 040	990 828	1 563 601	903	1 643
2007	0.40	47.98	52.24	5 735	7 989	747 948	1 542 734	701	1 624
2008	0.54	51.54	56.07	4 880	7 342	613 785	1 384 578	619	1 496

In 2009 prices for most species declined dramatically due to the economic crisis. Preliminary data of the Netherlands shows that averages prices for sole decreased by 16% and average prices for plaice decreased by 30%. Even with the higher TAC's for sole and plaice for 2009 it is expected that the value of landings in 2009 will be lower than 2008 due to these price decreases. Thus the economic performance will be negatively affected by the economic crisis in 2009.

In January 2008 several of the larger Dutch beam trawl vessels (>40m) were decommissioned. This resulted in a capacity reduction of about 15%. The remaining vessels were, therefore, able to get more quota and days at sea per vessel.

For some fleet segments targeting sole and plaice in the North Sea the restrictions following the cod multi-annual plan are much more restrictive than the ones from the flatfish plan. In case of the German small beam trawl fleet fishermen received no sea-days due to a lack of cod catches in the reference period. Because of cod bycatch in the sole and plaice fishery they were not allowed to fish at all on flatfish in 2009.

6.5.4. Economic sustainability of the plan

We cannot draw a definite conclusion on economic sustainability, however the expectations of the experts at the meeting is that for 2008 and 2009 the possible economic effects of the multi-annual plan are dwarfed by the external effects mentioned above.

6.6. Added value of the multi-annual plan

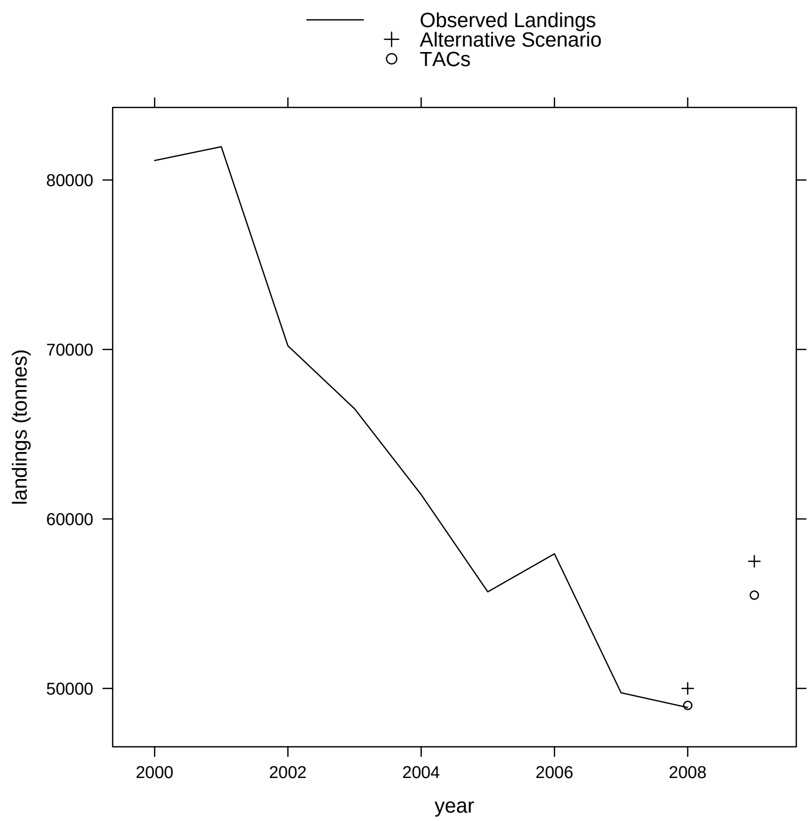
This aspect was addressed by evaluating the different TACs that would have been set in the absence of the plan using Commission policy documents to define the alternative rules (See Annex 2A for more detail on the method). The effect on TAC, SSB and where possible economic indicators is discussed below, highlighting benefits/losses to the fishery and to the stock that have resulted from the multi-annual plan.

North Sea Plaice

The stock was outside safe biological limits in 2007. According to the rules of the Commission policy statement this would have led to a proposed TAC for 2008 that would reduce fishing mortality and would not lead to further deterioration in the stock. Likely levels are an *F* of around 0.5, corresponding to a TAC in 2008 of 50 000 t

In 2008 the stock would have been perceived to be inside safe biological limits but to be exploited at a level greater than that consistent with achieving maximum sustainable yield. A TAC for 2009 would have been set that would have been consistent with achieving the highest long term yield, subject to a maximum change in the TAC of 15%. This would have led to a TAC in 2009 of 57 500 t. (Figure 6.6.1)

Landings as reported to ICES have been in close agreement with the agreed TAC for this stock indicating little under or over-shoot of the TAC in recent years. Consequently, no implementation error has been applied in either 2008 or 2009.



Year	*Agreed TAC*	*Alternative Scenario TAC*
2008	49 000 t.	50 000 t.
2009	55 500 t.	57 500 t.

Figure 6.6.1 North Sea plaice alternative scenario evaluation. Observed landings, as reported to ICES are shown for the period 2000 to 2008 along with the agreed TACs and alternative scenario TACs for 2008 and 2009.

The likely TACs that would have applied in the absence of the multi-annual plan are very similar to those that have been applied under the plan. This is largely a consequence of the increase of the stock in recent years and consequent increase in catch opportunities, resulting in the TAC change being capped to 15% in both the multi-annual plan and the alternative scenarios. Under the alternative scenario there is almost no difference in the estimated values of SSB from those observed.

North Sea Sole

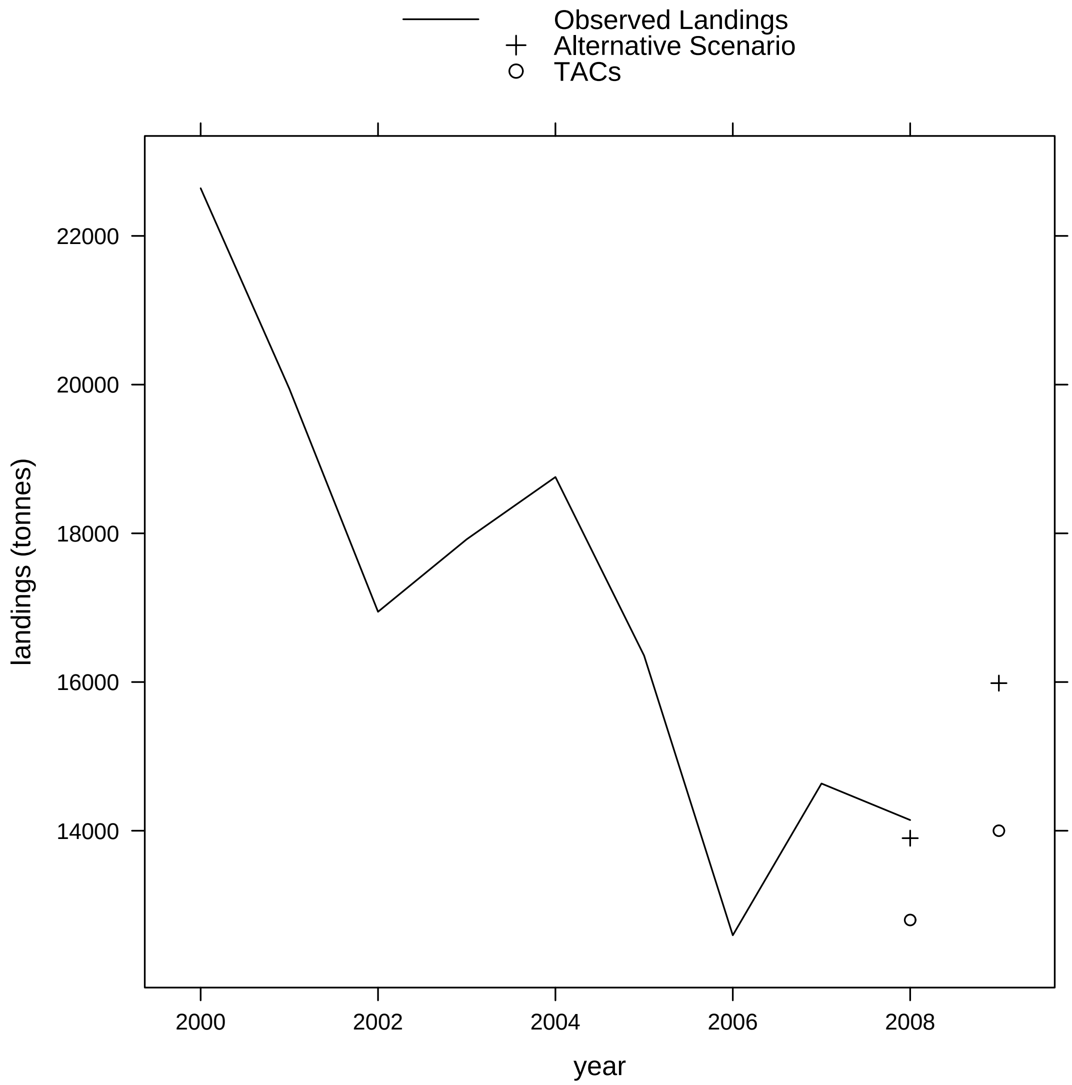
The stock was outside safe biological limits in 2007. According to the rules of the policy statement this would have led to a proposed TAC for 2008 that would reduce fishing mortality and return the stock to safe biological limits. To achieve B_{PA} in 2009 would have required an 8% reduction in the TAC corresponding to landings in 2008 of 13 900 t.

The assumed TAC for 2008, as calculated above, is around 1000 tonnes greater than the TAC that was actually applied in 2008 under the management plan. In 2008 the stock would been estimated to be inside safe biological limits. Under the policy statement, a TAC would have therefore been set for 2009 at the higher value of catch corresponding either to long term yield or to an unchanged fishing mortality, subject to a maximum change in TAC of 15%. The 15% constraint would have been applied leading to a likely TAC in 2009 of 15 985 t (Figure 6.6.2).

An approximate 10% overshoot of the TAC was observed for North Sea sole in 2008. It has been assumed that, in the absence of the multi-annual plan, this % overshoot would have been the same in 2008. Therefore a 10% implementation error has been applied leading to assumed landings of 15 290 t in 2008 and 2009 respectively.

There is some evidence of a retrospective pattern in estimates of fishing mortality and SSB for North Sea sole. However, for SSB the level of bias is not strong and annual revisions of terminal estimates are relatively small. Consequently no correction for assessment error has been applied in this instance.

The likely TACs for North Sea sole that would have been applied in the absence of the multi-annual plan show some differences to those that have been applied under the plan. The TAC likely to have been set in 2008 and 2009 are slightly higher than those set under the plan. Under the alternative scenario there is almost no change in the estimated values of SSB.



Year	***Agreed TAC***	***Alternative Scenario TAC***
2008	12 800 t.	13 900 t.
2009	14 000 t.	15 985 t.

Figure 6.6.2 North Sea sole alternative scenario evaluation. Observed landings, as reported to ICES are shown for the period 2000 to 2008 along with the agreed TACs and alternative scenario TACs for 2008 and 2009.

6.6.1. Economic and social benefits/losses that have resulted from the multi-annual plan.

It was not possible to run the EIAA-model properly up to 2009 for fleet segments with 2008 data to compare the situation with or without the plan. For 2008 in both cases, North Sea plaice and sole, the alternative TAC without the plan is calculated to be above the limit set by the plan. This implies a possibly better economic performance of the fishing fleet in case of a situation without the plan. However, the small differences in the TACs imply that the differences are very small and other factors were much more influential on the economic performance.

The plan was implemented 2008 and for most of the segments economic data was only available up to 2007. It was also not possible to disaggregate the data to differentiate between fisheries. For a sufficient evaluation at least three years of data are necessary to be able to identify trends. Therefore, the economists were not able to draw conclusions.

In 2006 STECF was requested to conduct an IA for the proposed North Sea sole and plaice multi-annual plan (STECF 2006). The following table shows some of the results from this assessment for the economic performance of the fleet.

Table 6.6.1_ Results from the IA of the NS sole and plaice multi-annual plan

Change in GCF (m€)	Segment	Average 02-04	Average 06-08 (Baseline)*	Average 06-08 (IA)*
Netherlands	TBB <24	10.3	9.4	9.4
	TBB >24	30.7	25.6	23.4
Denmark	DTS 024	5.3	5.7	5.6
	DTS 2440	14.8	15.2	15.2
Belgium	TBB 2440	10.2	9.1	8.2
UK	> 300 kw	0.2	-4.0	-3.7
Change in total effort (days)	Segment	Average 02-04	Average 06-08 (Baseline)*	Average 06-08 (IA)*
Netherlands	TBB <24	22,733	22,204	22,156
	TBB >24	24,833	24,178	22,433
Denmark	DTS 024	66,500	67,984	67,967
	DTS 2440	31,400	32,218	32,215
Belgium	TBB 2440	10,633	10,676	9,605
UK	> 300 kw	7,767	7,713	7,016
*Baseline and IA numbers based on the SGECA-SGRST 0605 report				

As baseline scenario a constant *F* was chosen. This is not totally comparable to the 'no-multi-annual-plan' scenario used in this report. In the IA the scenario with the management plan showed slightly lower numbers for GCF and it seems quite comparable with the situation comparing the no-management-plan scenario in this report (higher TACs than with the plan) and the situation after implementation of the plan.

The Impact Assessment predicted the biggest changes in the beam trawl fleet segments and very small changes in other segments. It was clear that with the multi-annual plan there will be losers and gainers. However, at this point it is not possible to assess if the real situation in 2008 was as predicted in the IA or not due to the lack of data for all segments and the problems to run the EIAA model with 2008 data.

6.7. SGMOS Evaluation of the Performance of the Plan

The Judgment provided on the following aspects is quantitative where possible but where data is limited a qualitative assessment is provided.

6.7.1. Effectiveness

6.7.1.1. Achievement of the objectives of the plan :- short term

In 2009 both NS sole and plaice stocks were estimated by ICES to be above B_{PA} (sole 35 000 and plaice 230,000) and exploited below F_{PA} (sole 0.4 and plaice 0.6). This is consistent with the objectives of stage 1.

In 2009 both NS sole and plaice stocks were estimated by ICES have been above B_{PA} for 2 years. Although plaice has been exploited below F_{PA} for 2 years sole has been exploited below F_{PA} for 1 year. Thus the criteria for transition to stage 2 have not yet been met.

Annual TAC changes have been maintained within a maximum limit of 15%.

Fishing mortality has been estimated by ICES in 2009 to have declined by 19% for plaice and 17% for sole in the first year of the plan (2007 to 2008). This exceeds the rate of decline required under the objectives of the plan.

Fishing mortality (ages 2-6 in 2008) is estimated by ICES as:-

plaice = 0.25 in 2008

sole = 0.34 in 2008

It is premature to evaluate medium term impacts.

6.7.1.2. Immediate impacts of the multi-annual plan on the environment and the ecosystem

Only very preliminary immediate impacts can be evaluated due to the timing of the review. Both stocks are now estimated by ICES to be exploited with fishing mortalities that are closer to F_{MSY} targets than before the plan was implemented.

There has been a general decline in effort (kW days) from 2000 for fleet targeting plaice and sole this has continued under the plan in 2007 – 2008, particularly for the large mesh (>120mm) beam trawl fleet.

The variability of the estimates of discard rates is too great to permit estimate of the changes discards in year one of the plan.

6.7.1.3. Side effects resulting from the plan

From the information examined we have been unable to detect any side effects. However, reductions in fishing effort might be expected to have resulted in reduced impact on the environment.

6.7.1.4. Influence on implementation of external factors such as global change, ecosystems effects, or other fisheries.

The effect of the cod plan, which has greater effort restriction than those required under the sole and plaice plan, has had some impact on effort of some fleets that catch cod with plaice and sole in 2009.

Increases in the price of fuel have affected both the allocation of fishing effort and the profitability of fleets.

6.7.2. Utility

6.7.2.1. Trends in fleet capacity expected and observed

There were no specific changes identified in the impact assessment. Expectations were that capacity would not increase. We had no information on trends or the current status of fleet capacity in this fishery besides the Dutch fleet. Due to the increase in fuel costs, Dutch vessels have started to reduce their engine power (see table in section 6.5.3). Thus a downward trend in the kW's is can be seen.

In 2008 the capacity of the Dutch fleet decreased by about 15% due to a decommissioning scheme. 23 larger beamtrawlers (>40m) were decommissioned.

6.7.2.2. Capacity of fleets affected by the multi-annual plan.

It has not been possible to make economic evaluations for the period of the plan due to a lack of economic data so soon after the start of the plan.

6.7.2.3. Contribution of the multi-annual plan to adapting the resulting fleet capacity

There is no evidence that the plan has contributed to changes in capacity, however changes in capacity observed are not inconsistent with the plan.

6.7.3. Efficiency (cost-effectiveness)

6.7.3.1. Costs of the plan (eg. employment, gross revenue of the fleet)

It has not been possible to make economic evaluations for the period of the plan due to a lack of economic data so soon after the implementation of the plan. There has been a change in fuel price that has affected gross revenue and it is not currently possible to separate this effect from the influence of the plan. See also section 6.5.2.

6.7.3.2. Economic benefit/loss during the period of implementation

There were no detectable changes in the economic performance of fleets for which preliminary data for 2008 were available. See also section 6.5.2.

6.7.4. Indicators

6.7.4.1. Usefulness of indicators used to evaluate the multi-annual plan

In the STECF plenary meeting spring 2009 the following indicators for economic performance were discussed.

*Value of landings – revenue from sale of fish

* Gross cash flow –income minus all operational costs (excluding capital costs)

* Break even revenue –long term break even revenue the income level at which the profits are zero

* Gross profit income minus all costs, including capital costs

* Gross value added contribution to gross national product (GNP) income minus all expenses except capital costs and crew costs

* Fleet size and composition

* Employment

Based on the available data at the meeting it was not possible to evaluate the usefulness of these indicators however in general these indicators should be able to describe the economic consequences of the multi-annual plans. To determine the economic performance *a posteriori* an evaluation should be done by comparing a situation without management changes with the developments under the multi-annual plans. For this it is of the highest importance that a suitable economic model is available for such an evaluation. It should be assessed whether the EIAA model in its current form is suitable for all three multi-annual plans.

It is useful to consider extra indicators for economic and social performance of the multi-annual plans.

* market prices for sole and plaice.

* comparison of salaries in fisheries to salaries in other primary sectors and national average salaries

Market prices as indicators were discussed already in the IA for the sole and plaice plan (STECF 2006 ch. 9). There is a huge market for plaice and, therefore, quota fluctuations in one fishery may have little influence on the prices. For sole the market is quite small and changes in one fishery may affect prices more substantially. The following text table includes ex-vessel prices for sole and plaice comparing the prices in the Netherlands (range from several regions) and Belgium with the overall price level. The landings in the Netherlands and Belgium are over 60% of the total landings of sole and plaice.

	2007	2008	2009
North Sea **Sole**	€/kg	€/kg	€/kg
Netherlands	9.3-11.8	9-10.3	8.2-10.6
Belgium	11.6	9.8	8.3
Overall	11.4	10.5	9

	2007	2008	2009
North Sea **Plaice**	€/kg	€/kg	€/kg
Netherlands	1.95-2.07	1.68-1.94	1.2-1.42
Belgium	1.93	1.8	1.3
Overall	2.01	1.83	1.37

The prices for both species follow a similar trend. In 2009 the price was substantially lower than the previous years due to the overall economic crisis. The sole price in 2009 is 15% lower than in 2008, the price for plaice 25%. There seems to be a greater effect on the plaice market (maybe because of easier substitution).

6.7.5. *Sustainability*

It was not possible to draw a conclusion on the overall sustainability of the plan from an economic perspective. As other factors influenced the fleet segments more heavily than the implementation of the management plan it is obvious that reductions in fleet capacity and poor economic performance of many segments are not the effect of the plan. In the long run the fishing fleet may adapt to higher fuel prices. The lower prices for sole and plaice had also a huge influence on the economic performance. At the moment it is unclear if fish prices will be back at a higher level or stay at the actual level. With increasing catch possibilities in the future, as predicted now with the plan in place, lower fuel consumption and higher catches may improve the economic performance of the remaining vessels.

6.8. SG-MOS Conclusions for North Sea sole and plaice plan

Based on the information above the subgroups overall judgement on the plan is provided below.

Regarding the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy.

The plan provides an explicit long term objective for exploitation consistent with the CFP that would not be so clear without the plan.

There are explicit tactical rules for transition to the long term exploitation objectives of the plan, which make the implementation of change more predictable for participants.

Where effort regulation is coupled to changes in TAC there is improved consistency between fishing effort and catching opportunities.

Regarding removals from the population, TACs appear to have been the more restrictive element of the multi-annual plan. The effort component of the plan does not appear to have been restrictive up to and including 2008.

In practice the TACs that have been set for plaice under the multi-annual plan are similar to those that would have been set under the Commissions TACs policy document (2009/224) (15% limit to annual changes in TAC). For sole the TAC likely to have been set without the multi-annual plan would have been slightly higher resulting a much lower TAC being set in 2009 under the Commissions TACs policy document (2009/224)

The plan contains a maximum 15% constraint in annual quota change (increase or decrease) as the basic economic instrument. It was introduced to allow for easier adjustments on the fish markets to reduce price jumps.

Regarding the plan success in achieving its stated objectives

The stocks of plaice and sole are closer to the long term objectives than they were at the beginning of the plan. However, it is not yet possible to identify whether this is explicitly the result of the plan.

Regarding most important elements of the plan that would influence achievement of its objectives.

Targets for exploitation are preferable to biomass targets to achieve biological sustainability. Long term targets combined with annual rules provide a useful basis for annual decision making on exploitation rates. Constraints on annual change in TAC are expected to be important for obtaining economic stability. This is expected also to improve acceptability to policy makers and stakeholders and therefore implementation.

Regarding specific indicators that would be useful for a future evaluation of this multi-annual plan

There are no specific recommendations for extra indicators relating to this plan. Section 6.7.4.1 discusses the issues but further consultations with stakeholders are required to establish if there are more appropriate indicators. Section 7.2 makes preliminary recommendations.

Regarding additional data that should be collected in the future to help in evaluating the multi-annual plan

Additional data suggestions are given below in section 7.5.4

Regarding links that should be made between this and other plans.

Plans should be fishery based. Fisheries for plaice and sole are to some extent mixed fisheries which also take cod. Where this is the case there will be interactions between this plan and cod recovery. While links currently exist for effort regulation, no such link exists for setting TACs. If the objectives of both plans are to be achieved it is necessary to examine what linkages in TAC rules are necessary.

Regarding elements of the plan that require revision.

A clause concerning what to do if the assessments are nolonger accepted is required.

The long term targets for plaice and sole need to be checked and evaluated for compatibility.

Long term plans need to be considered over a number of years. The minimum period that should be considered for routine evaluation is 3 years after implementation. The timing of evaluations of plans needs to be linked to the availability of data. For example 3 years of biological data become available at approximately month 48 and 3 years of economic data at approximately month 60. Thus a full 3 year evaluation cannot be conducted until 5 years from the commencement of the plan.

7. FURTHER DEVELOPMENT OF THE STECF PROCEEDURES FOR EVALUATING MULTI-ANNUAL PLANS

7.1. Time line for multi-annual plans and evaluations

In carrying out the evaluation of these multi-annual plans considerable difficulties were encountered in providing useful answers to some the aspects of evaluation given in Annex A, in particular some of the economic issues. This was primarily because the evaluations were carried out before the relevant data collected during the implementation of the plan could be made available. In order to provide information on what can be done the group has provided a timeline below which shows when differing types of information becomes available after the plan has been agreed. Once a particular type of evaluation has been selected it will be possible to determine when this can be carried out by checking the availability of information on the timeline below. For example an evaluation of three years duration of biological data can be carried out at approximately month 48 , but for three years of economic data the plan cannot be evaluated before approximately month 60. The diagram below (Fig 7.1) deals with data only from Member States the Commission and ICES, however, some information on the fisheries may be available from other sources such as RACs more quickly.

Time	Advice and actions	Months	Information collection	Data relavant to evaluation
Year 0	Management plan agreement (mid year)	0		
Dec year 0	TAC/effort agreed for year 1	5		
Jan year 1	Fishery under plan year 1	6		
Spring year 1		8	Scientific abundance surveys year 1	
July year 1	ICES / STECF advice state of stock Jan 1 for year 1 Forecast catch options year 2	12		
Autumn year 1		15	Recruit surveys year 1	
Dec year 1	TAC/effort agreed for year 2	17		
Jan year 2	Fishery under plan year 2	18		
Spring year 2		20	Scientific abundance surveys year 2	1st data survey data after 1st year plan
April year 2		22	Fishery data completed year 1 Economic data completed year 0	
July year 2	ICES / STECF advice state of stock Jan 1 year 2 Forecast catch options year 3	24		Biology 1 year
Autumn year 2		27	Recruit surveys year 2	
Dec year 2	TAC/effort agreed for year 3	29		
Jan year 3	Fishery under plan year 2	30		
Spring year 3		32	Scientific abundance surveys year 2	
April year 3		33	Fishery data completed year 2 Economic data completed year 1	Economics 1 year
July year 3	ICES / STECF advice state of stock Jan 1 year 3 Forecast catch options year 2	36		Biology 2 years economics 1 year
Autumn year 3		39	Recruit surveys year 3	
Dec year 3	TAC/effort agreed for year 4	41		
July year 4	ICES / STECF advice state of stock Jan 1 year 4	48		Biology 3 years economics 2 years
July year 5	ICES / STECF advice state of stock Jan 1 year 4	60		Biology 4 years economics 3 years

Fig 7.1 Time Line of actions and information relating to evaluation of management plans.

7.2. Adaptations to the evaluation framework

The framework presented in STECF plenary July 2009 augmented by indicator list from STECF plenary April 2009 has been used for this evaluation and is given in Annex A. The structure of each MAP evaluation above is based on this framework. Generally the framework has worked well. In this particular instance it has been too extensive or ambitious to achieve fully. The MAPs evaluated have only a short period after implementation and the resulting shortage of data (see 7.1 above) has limited the evaluation.

Experience of this meeting suggests that if a full set of data was available after 60 months for example (see 7.5.2) then the evaluation would require at least two meetings, one to plan the evaluation, followed by a period of work and at least one more meeting to complete a report.

In addition to those indicators in the template (Annex A) It is useful to consider extra indicators for economic and social performance of the multi-annual plans.

* market prices for sole

* comparison of salaries in fisheries to salaries in other primary sectors and national average salaries

Market prices as indicators were discussed already in the IA for the sole and plaice plan (STECF 2006 ch. 9). For sole the market is quite small and changes in one fishery may affect prices more deeply. For plaice the market is bigger and may be less influenced by the fishery.

Consultation between Commission, STECF or (SGMOS) and the RACs may be able to elicit more suitable economic and social indicators and the establish how the data can be collected.

7.3. Participation: experts and observers

7.3.1. Roles

For this meeting an invitation was extended to NS, NWW and SWW RACs. For the NWW Jim Portus attended, for SWW Delphine Ciolek attended, nobody from NS attended. Both Delphine Ciolek and Jim Portus were given and took the opportunity to make a presentation and participated in discussions throughout the Wednesday, when the details of the information were presented. In addition they provided written submissions (Annex H) which summarised what was presented.

Observers and participants have different roles:

STECF experts are required to sign declarations of independence (Annex I) and participate in the preparation of the report.

Observers may participate in the meeting under rules that ensure they do not unduly influence the report. (Annex F). In this meeting observers were invited for 1 day in the middle of the meeting (Wednesday). This day was set aside for the discussion of all information available for the evaluation. Days prior to this were used to assemble information, and subsequent days to complete the report. In order to facility greater transparency this format could be extended to allow observers to be present throughout the meeting if they wished. However, the format of a single day to discuss information available should be maintained.

7.3.2. Information supplied

Before this meeting a list of information required for the review was sent to the Commission. The response to this list contained a number of useful and important pieces of information. However, during the meeting additional information was required. An amended list which forms a start point for future meetings is included as Appendix IV

7.4. Considerations for impact assessments

During the evaluations a number of concerns were raised regarding unnecessary or unnecessarily large fluctuations in TACs between years. One element in this is the potential for TACS to change due the revision of scientific information. This revision is a necessary part of the provision of advice as, over time, more information becomes available. Nevertheless it is important to ensure that changes in TACs or effort allocations react in a timely fashion to real change but do not overreact to short term noise or bias in the assessments. For example, using F estimates as a basis for setting TACs is sensitive to any retrospective changes in perceived F and may in lead to the propagation of errors from one year to the next. The constrains on change in TAC, such as the 15% limits included in the NS flat fish plan, are chosen partly for economic reasons, but they also perform an important smoothing function damping errors in the assessment. Whether it is the assessment that is smoothed, giving less change in the TAC, or the TAC that is constrained to respond more slowly than the assessment and projections, is immaterial, the inclusion of appropriate smoothing is an important part of management.

Therefore when carrying out Impact Assessments it is particularly important that the errors in the scientific information are correctly factored into the impact assessment, the correct time to include appropriately errors in the assessment is in the design stage of the management plan, optimising the HCR appropriately, and not trying to tinker with observed errors afterwards. If the errors are included in the Impact Assessment then the approach chosen should be noted appropriately in the detailed annex attached to a multi-annual plan as described below in Section 7.5.1. This process will ensure that it is clear what types of error have already been accounted for, reducing the need for unnecessary revision but also providing a sensible basis for revision if error structures are seen to change.

7.5. Implications for consideration by the Commission

7.5.1. Changes to plans

Specific recommendations are contained in each evaluation but there is one generic recommendation that a clause is required to indicate what should be done if an analytic assessment is required by the plan is nolonger available (possibly because it is nolonger accepted).

There is a general requirement that MA plans should be fishery based. For example fisheries for plaice and sole are to some extent mixed fisheries which also take cod. Where this is the case there will be interactions between these plans and cod recovery plans. While a mechanism currently exist for harmonising effort regulation, no such mechanism exists for setting TACs. If the objectives of two or more plans are to be achieved it is necessary to examine what linkages in TAC rules are necessary.

In general MA plans are produced with little information on the supporting information a process required to deliver the parameters of the plans. It would be better if a more integrative approach to the plans was adopted. One approach would be that an annex which is supplied with each plan detailing the data to be used, the calculation methods to be applied for elements that are used to determine actions under the plan. To avoid creating problems if methods need to change or data becomes unavailable such an annex could be amended as necessary subject to agreement of STECF.

7.5.2. Timing of evaluations

Long term plans need to be considered over a number of years. The minimum period that should be considered for routine evaluation is 3 years after implementation. The timing of evaluations of plans needs to be linked to the availability of data. For example 3 years of biological data become available at approximately month 48 and 3 years of economic data at approximately month 60. Thus a full 3 year evaluation cannot be conducted until 5 years from the commencement of the plan.

7.5.3. Meeting planning

Preparation of ToR for evaluations should involve greater consultation amongst other participants, such as stakeholders to ensure the criteria used can provide appropriate information on the performance of the plan. Sufficient time should be set aside early enough to develop ToR and to inform observers of the meeting dates and agenda so that participation is optimal. For example initial ToR and meeting dates could be set 6 months before the meeting to allow for consultation and some preliminary work.

7.5.4. Data required

Greater benefit can be obtained from evaluations (and impact assessments) if some additional data can be made available as follows:-

- Better access to weekly price database.
- Ensuring that parameters such as kW-days are reported in the Annual Economic Report and included within the database from DCF.
- Better links and harmonisation between collection of social, economic and fishery effort data will lead to better management options.
- Improved data on commercial gear selectivity would allow better simulation of fishing activity.
- More information on the behaviour and drivers in fisheries. (RACs) will help with modelling changes in fisheries.
- Extending fishermen’s surveys coordinated by RACs would provide a way to include some stakeholder views.
- Better quality effort data can be obtained by linking VMS data with log books.

If the effectiveness and costs of enforcement are to form part of the evaluation of a multi-annual plan then there is a need for enforcement data to be provided with links and harmonisation between inspections and compliance fishing effort and TAC uptake data.

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8. ACKNOWLEDGEMENTS

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ANNEX A: FRAMEWORK FOR THE EVALUATION OF MULTI-ANNUAL PLANS

A review of the practical implementation of the multi-annual plan considering the actions taken and measures implemented at the Member State level.

1. BACKGROUND

Provide the basic background of the plan

2. DESIGN ISSUES

• What issues relating to the design of the plan can be identified. eg. differences and/or ambiguity in interpretation of the requirements and/or provisions of the plan, or different levels of implementation of the plan. Analysis should be conducted at the Member State level.

• Has the plan been updated in the light of new information since first implementation e.g. have reference points been updated in line with more recent advice?

• In the case of multi-species plans, are the procedures for setting the TACs for the different species likely to lead to imbalances in the TAC levels for the stocks concerned.

• Has the potential overlap with other multi-annual plans been adequately addressed?

3. ENFORCEMENT AND COMPLIANCE

• What level of compliance has been achieved (using the background information provided above - analysis should be conducted at MS and EU level – i.e. MS implementation may differ and have differing outcomes)?

4. ENVIRONMENTAL EFFECTS OF THE PLAN

4.1. Evaluation of the effects of the multi-annual plan on the fishery

• What has been the fishery response to the multi-annual plan? The response strategies of the fleets include possible shifts to other stocks or species, to other gears or metiers and other behavioural issues.

• What measures of the multi-annual plan are considered to have influenced the fishery response. Measures of the multi-annual plan will include

• Catch and effort limitations – either through TAC or effort management

• Technical measures – eg. Closed areas, gear restrictions, etc.

• Control and enforcement measures – eg. Entry and exit rules, allocation rights, etc.

• Capacity management measures

4.2. Evaluation of the effects of the multi-annual plan on the stock

This section should be adapted to any particular plan and stock. The terms of reference proposed hereafter are drawing on the generic aspects of the evaluation.

a) Evaluating the stock response to the changes in the fisheries resulting from the plan - is the plan delivering its own internal objectives with respect to the stock?

• What changes in the stock dynamics can be identified and to what extent are these consistent with (or attributable to) changes in the fishery imposed by the multi-annual plan?

For example can reductions in fishing mortality be identified in instances where fishing effort has been reduced.

b) Evaluating whether the values of target and other reference points referred to in the plan are consistent with current knowledge and the objective of achieving MSY by 2015.

• Are the reference points in the plan still sensible given the latest information on stock status and dynamics?

• Is the plan likely to achieve MSY by 2015? If not, why?

• Is there a need to revise the measures in the plan to make it more effective in achieving the objectives?

• Is STECF able to propose options for a better plan to achieve stock – specific objectives?

4.3. Evaluation of the effects of the multi-annual plan on the ecosystem.

• What impacts of the multi-annual plan on the ecosystem can be identified? Ecosystem impacts might include changes in discarding practices, by-catch rates, habitat degradation, etc.

5. SOCIAL AND ECONOMIC EFFECTS OF THE PLAN

5.1. Data and Calculation of Indicators

• If there is no explicit socio-economic objective defined by the multi-annual plan the evaluation should be against the general socio-economic objectives as stated in the CFP.

• Characterise the social and economic state of the fleets exploiting the stock or stocks concerned using appropriate indicators, i.e. those proposed in the plan these below proposed by STECF in the April 2009 plenary report,.

- *Value of landings* ~ revenue from sale of fish.
- *Gross Cash flow* ~ income minus all operational costs (excluding capital costs).
- *Break even revenue* ~ long term break even revenue. The income (revenue) level at which economic profit is zero.
- *Gross Profit* ~ income minus all costs, including capital costs.
- *Gross Value added* ~ contribution to gross national product (GNP). Income minus all expenses except capital costs and crew cost.
- *Fleet size and composition*
- *Employment*

• The implementation and enforcement costs should be estimated, if possible in order to assess their cost effectiveness e.g do the benefits outweigh the cost of implementation and enforcement.

6. WHAT HAS BEEN THE ADDED VALUE OF THE MULTI-ANNUAL PLAN

The question "What is likely to have happened if the multi-annual plan had not been put in place?" should be addressed. This should include a comparison between the current state of the stock and fisheries compared to the situation that is likely to have occurred had the multi-annual plan not been implemented. The scenario representing the absence of the plan will constitute the baseline scenario, as advised by the desk officer.

• With specific reference to the items identified in section 2, identify the benefits/losses to the fishery and to the stock that have resulted from the multi-annual plan. Analysis to be based on indicators of stock status and exploitation rate

- With specific reference to the items identified in section 3, identify the economic and social benefits/losses that have resulted from the multi-annual plan. Analysis to be based on suitable social and economic indicators.

7. PERFORMANCE EVALUATION OF THE PLAN

Based on the above analyses please answer the following questions.

NB: the judgment provided on the following questions could be qualitative (at this stage) where data are not available. Similarly if other effects are detected they can be considered.

Effectiveness

- What have been the immediate results and medium term impacts for the stock addressed by the multi-annual plan? Have the objectives of the plan been achieved?

- What have been the immediate results and medium term impacts of the multi-annual plan on the environment and the ecosystem, for example by-catch, discards, non-target species?

- Have there been any side effects resulting from the plan? (for example, changes in behaviour that affect other fisheries, or environmental consequences, changes in the market).

- Has the implementation been affected by external factors such as global change, ecosystems effects, or other fisheries?

Utility

- What trends in fleet capacity (kW or GT) would have been expected from the implementation of the plan? What trends were actually observed?

- Are the fleets affected by the multi-annual plan in a situation of overcapacity?

- Did the multi-annual plan contribute to adapting the fleet capacity to the fishing possibilities resulting from the multi-annual plan?

Efficiency (cost-effectiveness)

- What have been the costs of this plan in terms of for example employment, gross revenue of the fleet?

- Have there been any effects on the broader industry (processing, transporting, auxiliary)?

- What have been economic benefit/loss during the period of implementation? STECF will require guidance on to whom this applies.

Indicators

- Were the indicators used sufficiently useful to evaluate the multi-annual plan?

Sustainability

From the experience so far,

- Is it possible to draw conclusions about the sustainability of the plan that differ from those envisaged by the initial impact assessment?

8. CONCLUSIONS

Based on the answers to previous questions, *please give us your global judgement on the plan*

- With regards to the utility and sustainability of the multi-annual plan and its contribution to the objectives of the Common Fisheries Policy.

- Is the plan succeeding in achieving its stated objectives

- Which elements of the plan have had the greatest influence in achieving the objectives.

- Are there any specific indicators that would be useful for a future evaluation of this multi-annual plan?

- Are there any additional data that should be collected in the future to help in evaluating the multi-annual plan?

- Should the plan be linked to other plans?

- Are there any elements of the plan that require revision? What are the proposals for revision?

ANNEX B: METHODS USED IN THE EVALUATION

B1: Alternative Scenario TAC setting procedure

In determining the most plausible alternative scenario that are most likely to have occurred in the absence of the management plan, the respective policy statements in the appropriate years have been used to formulate the management that would have been implemented. In addition the level of assessment error (retrospective bias) and implementation error (overshoot/undershoot of TAC) have also been taken into consideration, where appropriate, in order to take account of what is likely to have happened in the fishery. The proposed TACs for 2007, 2008 and 2009 would have been calculated according to the Policy Statements COM(2006) 499 final (EC 2006c), COM (2006) 295 final (EC 2007c) and COM(2008) 331 final (EC 2008c) respectively. However, it should be noted that in the absence of a legal obligation to follow these rules, it is not easy to estimate the TACs that would have been agreed by Council.

Method

Probable TACs that would have been applied under the alternative scenario were calculated from a hindcast analysis using the most recent stock assessment as conducted by ICES. The stock data were truncated to the year prior to the first year of the management plan and an XSA assessment conducted to determine stock status and exploitation levels as estimated in that year (ie including any retrospective bias). The TACs for future years were then calculated from a succession of deterministic short term forecasts using the TAC setting rules outlined in the relevant policy statement for each of the years over which the analysis was conducted.

A number of measures were taken to account for error and bias in the estimation and implementation of the TAC setting process. In each iteration of the process the recruitment values were replaced by those that would have been estimated by the assessment conducted in that year. Similary instances in which an SSB constrained forecast were conducted, the level of catch required to achieve that SSB was adjusted to take account of any retrospective bias in the terminal estimates. In addition, in some instances, an additional error has been applied to account for imperfect implementation of the management actions (eg an overshoot of the TAC).

It should be noted that this approach will not have accounted for all of the uncertainty that would have applied in the real TAC setting situation. All analyses have been based on the 2009 assessment data. The stock assessment data will have been modified in each year. Consequently the retrospective analysis may only account for part of the total assessment error. Similarly implementation error has been based only on the difference between the agreed TAC and landings as reported to ICES.

All analyses were conducted in FLR using the following packages

FLCore version 3.0

FLAssess version1.99-102

FLXSA version1.99-100

B2 Methods used to evaluate spatial change in the stock

Spatial indices method is derived from WP2A of FISBOAT project 2006 methods developed by Woillez M., Rivoirard J. and Renard D. on http://www.ifremer.fr/drvecohal/fisboat/index.htm

List of indicators:

Indicator	Description	Retained
CG	Center of gravity	X
I	Inertia	X
A	Anisotropy	X
NSP	Number of spatial patches	X
PA	Positive Area	X
SA	Spreading Area	X
LIC	Local index of collocation	
GIC	Global index of collocation	X
g	Covariogram	
g_r	Relative covariogram	
K	Geometric covariogram	
EA	Equivalent Area	X
MI	Microstructure Index	X

Definition and generalities:

In the context of populations with diffuse limits, these indicators have been built to avoid the problem of the delineation of the area of presence, which may be variable from one year to another. And also, they are not affected by the zero sample values (Bez and Rivoirard, 2001).

Center of gravity and inertia

The spatial distribution of population can be easily summarized by tools such as center of gravity and inertia (Bez, 1997). The center of gravity is the mean location of the population – mean of location of its individuals, also the mean location of an individual taken at random in the field, and the inertia is the mean square distance between such an individual and the center of gravity. They are unaffected by zero values of population density and are spatial statistics (they are modified when changing the location of samples values). In the case of an irregular sampling, surfaces of influence affected to samples are used as weighted factors.

Anisotropy

The total inertia of a population can be decomposed on its two principal axes, orthogonal to each other, into the maximal and the minimal directional inertia. The square root of the inertia along a given axis gives the standard deviation of the coordinate of the population along this axis. When there is a marked difference in inertia between the directions, we talk about anisotropy. The square root ratio between maximum and minimum of inertia summarizes the anisotropy of the spatial distribution of the population.

Number of spatial patches

The spatial distribution of a fish population in a given area may not be homogeneous. Local aggregations of fish, i.e. spatial patches, may be present. To identify spatial patches, an algorithm has been written, based on a distance limit to attribute sample values to patches.

Positive area

A "surface of influence" is attributed to each sample. The positive area is the sum of the surfaces of influence of the positive values.

Spreading Area

This index comes from the selectivity curves which have been developed in mining geostatistics to characterize probability distributions and their dispersion (Matheron, 1981). These curves are in particular useful to handle the effect of the support on which the variable is measured or defined. They have been used in fisheries to look at the aggregation of values when the abundance changes (Petitgas, 1998). In order to have statistics which are not affected by the zero sample values, curves have been reversed bottom up, leading to the spreading area.

Local index of collocation

The local index of collocation looks the association between two populations at the sample support scale. In other terms, when no individuals of the two populations are found simultaneously in any sample location, it is equal to 0. This index is not a spatial statistics as it does not depend on the locations of the samples values (Bez and Rivoirard, 2000).

Global index of collocation

The global index of collocation looks how two populations are geographically melted or distinct by comparing their difference of CG to the mean distance between individuals taken at random and independently from each population (Bez and Rivoirard, 2000). It is a spatial statistics that ranges between 0, in the extreme case where each population is concentrated on a single but different location (inertia equal to 0), and 1, when the two centers of gravity coincide.

Covariogram, relative covariogram and geometric covariogram

The transitive approach can be used to describe the spatial distribution of a fish population when this includes a few large density values, and when delimitating a domain with homogeneous variations is difficult (Bez et al, 1995, Bez. et al., 1997). The (transitive) covariogram (or variants of it), function of the distance between two locations, is a tool for description of the spatial structure and can be used for mapping.

Equivalent area

The equivalent area is the integral range of the relative covariogram. It represents the area that would be covered by the population, if all individuals had the same density, equal to the mean density per individual.

Microstructure index

This index comes from the covariogram. It measures the relative decrease between distance h=0 and a distance h0 chosen to represent the mean lag between samples. It measures the relative importance of the structural components with scale smaller than h0 (including random noise).

For comparison between surveys, we have decided to fix the maximal area of presence which has been surveyed along the time series (polygon restriction); surfaces of influence are computed within this delineated domain from year to year. Using such weighted factors when computing spatial indices such as center of gravity, inertia, and global index of collocation, minimizes the effect of sampling along a time series.

Indicators calculation:

Center of gravity and inertia

Center of gravity and inertia of a population can be defined from the moments of the probability distribution function of a random individual:

x point in 2 dimensions (short for usual 2D notation (x, y)),

$z(x)$ density of population at location x,

$Q = \int z(x)dx$ total abundance of the population,

I individual taken at random and x_I its location,

$f_{x_I}(x) = \frac{z(x)}{Q}$, probability density function of x_I;

the expectation of x_I is:

$$E(x_I) = \overline{x}_I = \int x.f_{x_I}(x)dx = \int x\frac{z(x)}{Q}dx = \frac{\int x.z(x)dx}{\int z(x)dx}$$

and its variance is:

$$Var(x_I) = \sigma^2_{x_I} = \int (x - \overline{x}_I)^2.f_{x_I}(x)dx = \frac{\int (x - \overline{x}_I)^2.z(x)dx}{\int z(x)dx}$$

The expectation stands for the center of gravity of individuals and the variance for inertia. Practically, from sample values z_i at locations x_i, with surfaces of influence s_i, we have:

$$CG = \overline{x}_I^{\,*} = \sum_{i=1}^{N} x_i.s_i z_i \Big/ \sum_{i=1}^{N} s_i z_i$$

$$Inertia = \sigma^{2\,*}_{x_I} = \sum_{i=1}^{N} (x_i - \overline{x}_I^{\,*})^2.s_i z_i \Big/ \sum_{i=1}^{N} s_i z_i$$

Anisotropy

$$A = \sqrt{\frac{I \max}{I \min}}$$

Number of spatial patches

The algorithm starts from the richest value and considers each sample in decreasing order. It tests whether the current value is spatially close enough to the gravity center of previously defined patches. A distance limit from the patch gravity center is chosen at the beginning. If the value is not close enough, a new patch is considered, and so on until the last value. Patches of null values are returned with centers as NA and code 0 and their areas are summed.

The indicator obtains is the patch number for each sample which is superior to a percent of biomass.

Positive Area

$PA = \sum_i s_i$ avec $i \in \{i / z_i > 0\}$

Spreading Area

T	area covered by richest values (in nm2 or percentage of a maximal area).
Q	total abundance (in number of individuals).
Q(T)	abundance within area T (in number of individuals).
m	mean density over the maximal area
S	selectivity/aggregation indicator
s=S/m	selectivity/aggregation index

Let Q be the total abundance, Q(T) the abundance corresponding to the T area occupied by the highest density values. A selectivity, or aggregation, index, can be defined as:

$$2\int_0^1 \left(\frac{Q(T)}{Q} - T \right) dT$$

when expressing T as a proportion of a maximal given area. However this index dependent on this maximal area and on the zero values. The spreading area is proposed instead, equal to

$$2\int_0^1 \frac{R(T)}{Q} dT$$

with R(T) = Q-Q(T) being the abundance remaining off the richest area T. Note that the aggregation index and the spreading area are not spatial statistics (e.g. they do not change when inverting the densities between two sample locations).

Local index of collocation

Consider two populations, with densities $z_1(x)$ and $z_2(x)$ at point x. Then the local index of collocation is:

$$LIC = \frac{\int z_1(x) z_2(x) dx}{\sqrt{\int z_1^{\,2}(x)dx}\sqrt{\int z_2^{\,2}(x)dx}}$$

LIC depends on the quasi-point support x of the measurements (trawled surface).

Practically: $$LIC = \frac{\sum_{i=1}^{N} z_{1,i} z_{2,i}}{\sqrt{\sum_{i=1}^{N} z_{1,i}^{\;2}}\sqrt{\sum_{i=1}^{N} z_{2,i}^{\;2}}}$$ (when s_i are equal)

This index is the non centered correlation coefficient between z_1 and z_2 : it is not affected by the zero values, by contrast to the usual correlation coefficient.

Global index of collocation

Let us consider two populations, $z_1(x)$ and $z_2(x)$, their density at point x, ΔCG the distance between their centers of gravity and I_{z_1} and I_{z_2} their inertia. Then the global index of collocation is:

$$GIC = 1 - \frac{\Delta CG^2}{\Delta CG^2 + I_{z_1} + I_{z_2}}$$

$GIC = 1$ – ratio between the square distance between the 2 centers of gravity and the square distance between individuals from different populations.

Covariogram, relative covariogram and geometric covariogram

A structure spatial description of $z(x)$ is given by its (transitive) covariogram (Matheron, 1970; Bez and al., 1997), function of distance h:

$$g(h) = \int z(x) z(x+h) dx$$

We can also consider the relative covariogram $g_r(h)$, which has a meaning in term of individuals within a population. If we take two individuals at random and independently, the distance between them is a vectorial random variable, and its probability density function is the relative covariogram.

$$g_r(h) = \frac{g(h)}{Q^2} = \frac{\int z(x)z(x+h)dx}{\left(\int z(x)dx\right)^2}$$

Transitive covariogram mixes the geometrical properties of the domain of positive values and the behavior of the densities within it. But when applying to the indicator of the phenomenon, $1(x) = 1$ if $z(x) > 0$ and $1(x) = 0$ if not, the covariogram called the geometric covariogram characterizes the domain and its geometrical properties:

$$K(h) = \int 1(x)1(x+h)dx$$

Using 2D notation, the estimation of the covariogram in a regular 2D grid with mesh (a_1, a_2) and origin (x_0, y_0) is:

$$g^*(k_1a_1, k_2a_2) = a_1a_2 \sum_i \sum_j z(x_0 + ia_1, y_0 + ja_2)z(x_0 + ia_1 + k_1a_1, y_0 + ja_2 + k_2a_2)$$

In the case of an irregular grid, one estimation method consists of informing each point of a grid by its nearest sample value, and then to estimate the covariogram from that grid. The grid mesh is to be chosen in accordance with the sampling design. It should be fine enough to capture all samples data, but not too fine because this would suppress the nugget effect by linearizing the behavior at the origin.

Equivalent Area

$$EA = \frac{Q^2}{g(0)} = \frac{\int g(h)dh}{g(0)}$$

Microstructure index

$$MI = \frac{(g(0) - g(h0))}{g(0)}$$

ANNEX C: FISHERIES FOR SOLE IN THE WESTERN CHANNEL

Table C.1. Trends in effort (kW*Days) of regulated and non-regulated gear in the Western Channel by country (2003-2008). Data from SGMOS-09-05.

		COUNTRY													
GEAR	Data	BEL	DEN	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NED	NIR	SCO	SPN	Grand Total
3a	Sum of 2000	20996		2576121	811		90183				14710				2702821
	Sum of 2001	62198		3030424	43530		171795								3307947
	Sum of 2002	138893		2907916	17272		151338								3215419
	Sum of 2003	211491		3374514	34940		122867			23606					3767418
	Sum of 2004	550019		3206806	151249		209969			34577					4152620
	Sum of 2005	580016		3227096	150391		118973			16518					4092994
	Sum of 2006	565875		3283897	97912					6474					3954158
	Sum of 2007	746016		3021075	139113					16610			3666		3926480
	Sum of 2008	523556		2865492	159387					2143					3550578
3b	Sum of 2000			272583	59485										332068
	Sum of 2001			355504	124865										480369
	Sum of 2002			265270	369285										634555
	Sum of 2003			323618	417165										740783
	Sum of 2004			206294	501519										707813
	Sum of 2005			178818	530708										709526
	Sum of 2006			153434	298463								1215		453112
	Sum of 2007			103278	187018								3240		293536
	Sum of 2008			104187	295834								9315		409336
BEAM	Sum of 2000									70312					70312
	Sum of 2001			5254						12848	2184				20286
	Sum of 2002									8292					8292
	Sum of 2003			785	467										1252
	Sum of 2004			1290	1769		1476			3528					8063
	Sum of 2005			13177											13177
	Sum of 2006			8204	962										9166
	Sum of 2007			6031											6031
	Sum of 2008														
DEM_SEINE	Sum of 2000										1323				1323
	Sum of 2001										36507				36507
	Sum of 2002										32546				32546
	Sum of 2003										24093				24093
	Sum of 2004										52316				52316
	Sum of 2005			935							93233				94168
	Sum of 2006			561							159213		43167		202941
	Sum of 2007										112647		54137		166784
	Sum of 2008										90839		38877		129716
DREDGE	Sum of 2000			1622589	236753		115480		13000	3395			431991		2423208
	Sum of 2001			1129426	205982		107134		21138	33230	30598		256368		1783876
	Sum of 2002			1207266	186377		67461		16978	30223	18751		235547		1762603
	Sum of 2003			858731	173684		54327			115043	35540		382091		1619416
	Sum of 2004			1086811	250506					301069			404035		2042421
	Sum of 2005			1383215	237364					152539	111403		559791		2444312
	Sum of 2006			1345750	123289				19902	3880	11921		530881		2035623
	Sum of 2007			1366468	303577				1116	3340	86380		447184		2208065
	Sum of 2008	10360		876389	297665				778	663	76733		478502		1741090
GILL	Sum of 2000			17295	134397										151692
	Sum of 2001			22841	158162										181003
	Sum of 2002			23088	193473										216561
	Sum of 2003			14610	141656										156266
	Sum of 2004			92711	228819										321530
	Sum of 2005			74133	171106										245239
	Sum of 2006			85484	159889								1215		246588
	Sum of 2007			83531	116844										200375
	Sum of 2008	720		87470	191863										280053
LONGLINE	Sum of 2000			100017	12015										112032
	Sum of 2001			86917	19703										106620
	Sum of 2002		2655	87736	13723										104114
	Sum of 2003			120510	29539										150049
	Sum of 2004			102284	48860										151144
	Sum of 2005			126078	52669									61709	240456
	Sum of 2006			126111	36344									60115	222570
	Sum of 2007			147802	17379									58639	223820
	Sum of 2008			60225	52161								9489	45675	167550
none	Sum of 2000				2879										2879
	Sum of 2001				485										485
	Sum of 2002				1964										1964
	Sum of 2003				6718										6718
	Sum of 2004				24203										24203
	Sum of 2005				38263										38263
	Sum of 2006				13606										13606
	Sum of 2007				2894										2894
	Sum of 2008				6448										6448
OTTER	Sum of 2000		55907	1856642	10162234	15106	68549				46329		144818		12349585
	Sum of 2001		112906	1737162	11692300	40984	37776				37598		186275		13845001
	Sum of 2002		21890	1534360	17010714	32612	38959				47442		281611		18967588
	Sum of 2003		71914	1562848	13814578		3557				32350		293127		15778374
	Sum of 2004	4338		1653360	15059152					3000	11856	1302	198834		16931842
	Sum of 2005	6638		1696528	18409884	730	8657				15333		130287	13504	20281561
	Sum of 2006	14046	51488	1463901	14217612	6378	28217				1052		9946	22618	15815258
	Sum of 2007	12085		1500146	12931949	11393	42005				442		17582	23989	14539591
	Sum of 2008	23063		1482856	10998082	5605	34310			360			31119	31129	12606524

Table C.1. continued - Trends in effort (kW*Days) of regulated and non-regulated gear in the Western Channel by country (2003-2008). Data from SGMOS-09-05.

		COUNTRY													
GEAR	Data	BEL	DEN	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NED	NIR	SCO	SPN	Grand Total
PEL_SEINE	Sum of 2000														
	Sum of 2001														
	Sum of 2002														
	Sum of 2003				39										39
	Sum of 2004				654										654
	Sum of 2005														
	Sum of 2006														
	Sum of 2007				993									451	1444
	Sum of 2008														
PEL_TRAWL	Sum of 2000		108007	270840	111149			267076		425100	1847866		279978		3310016
	Sum of 2001		215146	432101	14910			207404		105000	1698456		298354		2971371
	Sum of 2002		199665	394005	18281			133473		112500	476891		258128		1592943
	Sum of 2003		118276	461064	11183			94385		87500	916727		29977		1719112
	Sum of 2004		1424	460964	4437			106234		40000	385683		5066		1003808
	Sum of 2005		46389	207676	16377			92768			412922		1341		777473
	Sum of 2006		51225	384227	15417			29865			783880		596		1265210
	Sum of 2007		31213	358552	13869	201				20000	695145		76127		1195107
	Sum of 2008		88637	436073	9053			36994			905628		48266		1524651
POTS	Sum of 2000			841424	1674	109786	2388								955272
	Sum of 2001			794902	3101	108745	3582						3384		913714
	Sum of 2002			791820	9655	11332							89		812896
	Sum of 2003			778987	4431										783418
	Sum of 2004			768336	12437	75868									856641
	Sum of 2005			754605	14451	56398									825454
	Sum of 2006			718063	5003	39402									762468
	Sum of 2007			679532	2598	46116									728246
	Sum of 2008			720292	3760	22771									746823
TRAMMEL	Sum of 2000			5252	47706										52958
	Sum of 2001			1456	87394										88850
	Sum of 2002				37797										37797
	Sum of 2003			146	59594										59740
	Sum of 2004			11221	122688										133909
	Sum of 2005			5574	169608										175182
	Sum of 2006			6364	212824										219188
	Sum of 2007			7163	240694										247857
	Sum of 2008			16632	354175										370807

Table C.2. Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (anglerfish, hake, plaice and sole) in the Western Channel. Data from SGMOS-09-05.

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
3a	ANF	Sum of 2003 L	48	411	1		39			1				500
		Sum of 2004 L	223	512	0		58			1				794
		Sum of 2005 L	169	589	4		32			3				797
		Sum of 2006 L	217	787	7					3				1014
		Sum of 2007 L	241	838	3					3				1086
		Sum of 2008 L	100	858	0					0				958
	HKE	Sum of 2003 L	0	5			0			0				5
		Sum of 2004 L	1	5			0			0				6
		Sum of 2005 L	1	5			0			0				6
		Sum of 2006 L	1	5	0					0				6
		Sum of 2007 L	0	3						0				4
		Sum of 2008 L	0	10										10
	PLE	Sum of 2003 L	38	763	2		17			0				820
		Sum of 2004 L	46	689	34		32							801
		Sum of 2005 L	48	700	13		8							769
		Sum of 2006 L	51	686	6					0				743
		Sum of 2007 L	83	483	5							0		571
		Sum of 2008 L	66	473	5									543
	SOL	Sum of 2003 L	1	180	6		13			1				200
		Sum of 2004 L	7	127	43		7			0				185
		Sum of 2005 L	25	413	41		19							498
		Sum of 2006 L	32	467	31					0				530
		Sum of 2007 L	34	428	33					0				494
		Sum of 2008 L	24	372	29					0				426
3b	ANF	Sum of 2003 L		77	524									601
		Sum of 2004 L		29	735									764
		Sum of 2005 L		4	631									635
		Sum of 2006 L		4	350									354
		Sum of 2007 L		4	183									187
		Sum of 2008 L		2	222									224
	HKE	Sum of 2003 L		162	5									167
		Sum of 2004 L		108	4									112
		Sum of 2005 L		94	4									98
		Sum of 2006 L		53	3								292	348
		Sum of 2007 L		16	1									17
		Sum of 2008 L		7	2									9
	PLE	Sum of 2003 L		0	11									11
		Sum of 2004 L		2	17									18
		Sum of 2005 L		0	26									27
		Sum of 2006 L		0	13									13
		Sum of 2007 L		0	7									8
		Sum of 2008 L		1	3									4
	SOL	Sum of 2003 L		1	28									29
		Sum of 2004 L		1	48									48
		Sum of 2005 L		1	87									88
		Sum of 2006 L		1	40									41
		Sum of 2007 L		5	44									49
		Sum of 2008 L		7	38									44
BEAM	ANF	Sum of 2003 L		0										0
		Sum of 2004 L		0			0			1				1
		Sum of 2005 L		3										3
		Sum of 2006 L		1	0									1
		Sum of 2007 L		2										2
		Sum of 2008 L												
	HKE	Sum of 2003 L		0										0
		Sum of 2004 L								0				0
		Sum of 2005 L		0										0
		Sum of 2006 L		0										0
		Sum of 2007 L		0										0
		Sum of 2008 L												
	PLE	Sum of 2003 L		1	0									1
		Sum of 2004 L		1	0		0			0				2
		Sum of 2005 L		2										2
		Sum of 2006 L		1	0									1
		Sum of 2007 L		2										2
		Sum of 2008 L												
	SOL	Sum of 2003 L		1	0									1
		Sum of 2004 L		0	1		0			0				1
		Sum of 2005 L		2										2
		Sum of 2006 L		1	0									1
		Sum of 2007 L		0										0
		Sum of 2008 L												

Table C.2. Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (anglerfish, hake, plaice and sole) in the Western Channel. Data from SGMOS-09-05.

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
DEM_SEINE	ANF	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L			0									0
		Sum of 2006 L			0								0	0
		Sum of 2007 L											0	0
		Sum of 2008 L											0	0
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L			0									0
		Sum of 2006 L			0								0	0
		Sum of 2007 L											0	0
		Sum of 2008 L											0	0
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L			0									0
		Sum of 2007 L												
		Sum of 2008 L												
DREDGE	ANF	Sum of 2003 L			26	6		0			3		14	50
		Sum of 2004 L			29	10					0		13	52
		Sum of 2005 L			30	4					1		21	57
		Sum of 2006 L			51	5				2			32	90
		Sum of 2007 L			53	8				0			20	81
		Sum of 2008 L		0	28	4							17	49
	HKE	Sum of 2003 L			0	0								0
		Sum of 2004 L			0	0								0
		Sum of 2005 L			0								0	0
		Sum of 2006 L			0								0	0
		Sum of 2007 L			0	0								0
		Sum of 2008 L			0	0								0
	PLE	Sum of 2003 L			3	4					0		0	7
		Sum of 2004 L			6	3							0	9
		Sum of 2005 L			10	4					0		0	14
		Sum of 2006 L			6	3							0	10
		Sum of 2007 L			2	5							0	7
		Sum of 2008 L			2	5							1	8
	SOL	Sum of 2003 L			6	12					0		0	19
		Sum of 2004 L			7	9							1	17
		Sum of 2005 L			16	10					0		2	29
		Sum of 2006 L			16	7							4	26
		Sum of 2007 L			16	12				0			4	31
		Sum of 2008 L		0	10	19							9	38
GILL	ANF	Sum of 2003 L			10	270								280
		Sum of 2004 L			76	510								586
		Sum of 2005 L			88	434								522
		Sum of 2006 L			69	314								383
		Sum of 2007 L			88	190								278
		Sum of 2008 L			94	214								307
	HKE	Sum of 2003 L			0	5								6
		Sum of 2004 L			2	1								3
		Sum of 2005 L			0	1								1
		Sum of 2006 L			0	0								1
		Sum of 2007 L			0	0								1
		Sum of 2008 L			1	0								1
	PLE	Sum of 2003 L			0	0								0
		Sum of 2004 L			0	0								0
		Sum of 2005 L			0	0								0
		Sum of 2006 L			0	0								0
		Sum of 2007 L			0	0								0
		Sum of 2008 L			0	0								0
	SOL	Sum of 2003 L			0	4								4
		Sum of 2004 L			0	2								2
		Sum of 2005 L			0	0								0
		Sum of 2006 L			0	0								0
		Sum of 2007 L			0	0								0
		Sum of 2008 L			0	0								0

Table C.2. Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (anglerfish, hake, plaice and sole) in the Western Channel. Data from SGMOS-09-05.

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
LONGLINE	ANF	Sum of 2003 L		5	0									5
		Sum of 2004 L		1	0									1
		Sum of 2005 L		1	0									1
		Sum of 2006 L		0	0									0
		Sum of 2007 L		2	0									3
		Sum of 2008 L		0										0
	HKE	Sum of 2003 L		0	0									0
		Sum of 2004 L		1									0	1
		Sum of 2005 L		0									1	1
		Sum of 2006 L		0	0									0
		Sum of 2007 L		0										0
		Sum of 2008 L		0										0
	PLE	Sum of 2003 L		0	0									0
		Sum of 2004 L		0	0									0
		Sum of 2005 L		0	0									0
		Sum of 2006 L		0	0									0
		Sum of 2007 L		0	0									0
		Sum of 2008 L		0	0									0
	SOL	Sum of 2003 L		0	0									0
		Sum of 2004 L		0	0									0
		Sum of 2005 L		0	0									0
		Sum of 2006 L			0									0
		Sum of 2007 L		0	0									0
		Sum of 2008 L		0	0									0
none	ANF	Sum of 2003 L			0									0
		Sum of 2004 L			1									1
		Sum of 2005 L			0									0
		Sum of 2006 L			0									0
		Sum of 2007 L												
		Sum of 2008 L			0									0
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L			0									0
		Sum of 2008 L												
	PLE	Sum of 2003 L			0									0
		Sum of 2004 L			1									1
		Sum of 2005 L			0									0
		Sum of 2006 L												
		Sum of 2007 L			0									0
		Sum of 2008 L												
	SOL	Sum of 2003 L			2									2
		Sum of 2004 L			2									2
		Sum of 2005 L			4									4
		Sum of 2006 L			4									4
		Sum of 2007 L			0									0
		Sum of 2008 L			0									0
OTTER	ANF	Sum of 2003 L		146	1823							0		1968
		Sum of 2004 L		139	1731							1		1870
		Sum of 2005 L		161	2022							0		2183
		Sum of 2006 L	0	160	1772		0					0		1933
		Sum of 2007 L	0	230	2011		0					0		2240
		Sum of 2008 L	0	228	1385	0	0							1613
	HKE	Sum of 2003 L		10	218		0					0		228
		Sum of 2004 L		5	167							0		172
		Sum of 2005 L		9	191									200
		Sum of 2006 L		4	111									116
		Sum of 2007 L		4	82									85
		Sum of 2008 L		12	87									99
	PLE	Sum of 2003 L		121	134		0							255
		Sum of 2004 L		117	114						0	0		232
		Sum of 2005 L	0	123	134		0							257
		Sum of 2006 L	1	163	147		1					0		311
		Sum of 2007 L	0	109	137		0							247
		Sum of 2008 L	1	119	132	0	0							252
	SOL	Sum of 2003 L		16	205		0							221
		Sum of 2004 L		15	150						0	0		165
		Sum of 2005 L	0	26	208									235
		Sum of 2006 L	0	28	208		0							237
		Sum of 2007 L	0	32	207		0							239
		Sum of 2008 L	0	25	160	0	0							186

Table C.2. Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (anglerfish, hake, plaice and sole) in the Western Channel. Data from SGMOS-09-05.

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
PEL_SEINE	PLE	Sum of 2003 L			0									0
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L			0									0
		Sum of 2008 L												
PEL_TRAWL	ANF	Sum of 2003 L			0									0
		Sum of 2004 L			0									0
		Sum of 2005 L			0									0
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L			0									0
		Sum of 2006 L			0									0
		Sum of 2007 L			0									0
		Sum of 2008 L												
	PLE	Sum of 2003 L		0	0									0
		Sum of 2004 L			0									0
		Sum of 2005 L		0	0									0
		Sum of 2006 L			0									0
		Sum of 2007 L		0	0									0
		Sum of 2008 L		0	0									0
	SOL	Sum of 2003 L			0									0
		Sum of 2004 L		0	0									0
		Sum of 2005 L			0									0
		Sum of 2006 L		0	0									0
		Sum of 2007 L			0									0
		Sum of 2008 L		0	0									0
POTS	ANF	Sum of 2003 L		2										2
		Sum of 2004 L		0										0
		Sum of 2005 L			0									0
		Sum of 2006 L		0	0									0
		Sum of 2007 L		1	0									1
		Sum of 2008 L		1										1
	HKE	Sum of 2003 L		0										0
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L		0										0
		Sum of 2008 L		0										0
	PLE	Sum of 2003 L		0	0									0
		Sum of 2004 L		0										0
		Sum of 2005 L			0									0
		Sum of 2006 L		0										0
		Sum of 2007 L		0	0									0
		Sum of 2008 L		0										0
	SOL	Sum of 2003 L		0	0									0
		Sum of 2004 L		0	0									0
		Sum of 2005 L		0	3									3
		Sum of 2006 L		0	0									0
		Sum of 2007 L		0	1									1
		Sum of 2008 L		0	0									0
TRAMMEL	ANF	Sum of 2003 L		0	136									136
		Sum of 2004 L		2	198									200
		Sum of 2005 L		9	283									292
		Sum of 2006 L		7	270									277
		Sum of 2007 L		6	397									402
		Sum of 2008 L		10	450									460
	HKE	Sum of 2003 L			2									2
		Sum of 2004 L			1									1
		Sum of 2005 L		0	2									2
		Sum of 2006 L		0	1									1
		Sum of 2007 L		0	1									1
		Sum of 2008 L		0	1									1
	PLE	Sum of 2003 L			1									1
		Sum of 2004 L		0	0									0
		Sum of 2005 L		0	1									1
		Sum of 2006 L		0	0									0
		Sum of 2007 L		0	0									0
		Sum of 2008 L		0	1									1
	SOL	Sum of 2003 L			1									1
		Sum of 2004 L		0	5									5
		Sum of 2005 L		0	1									1
		Sum of 2006 L		0	0									0
		Sum of 2007 L		0	1									1
		Sum of 2008 L		0	2									2

Table C.3. – Fleet specific landings of anglerfish, hake, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the Western Channel (2003-2008). Data from SGMOS-09-05.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
3a	ANF	Sum of 2003 L	**0.519**	**0.055**			**0.523**							**0.029**
		Sum of 2004 L	**0.791**	**0.090**			**0.549**			0.004				**0.064**
		Sum of 2005 L	**0.677**	**0.118**			**0.512**			**0.590**				**0.063**
		Sum of 2006 L	**0.699**	**0.118**	0.001					**0.715**				**0.078**
		Sum of 2007 L	**0.653**	**0.166**						0.006				**0.091**
		Sum of 2008 L	**0.497**	**0.126**						**0.238**				**0.076**
	HKE	Sum of 2003 L	0.003				0.004							
		Sum of 2004 L	0.002				0.003							
		Sum of 2005 L	0.003	0.001			0.004			0.004				
		Sum of 2006 L	0.002							**0.019**				
		Sum of 2007 L	0.001											
		Sum of 2008 L	0.001	0.001										
	PLE	Sum of 2003 L	**0.415**	**0.102**			**0.234**							**0.048**
		Sum of 2004 L	**0.164**	**0.121**	0.006		**0.304**							**0.064**
		Sum of 2005 L	**0.192**	**0.141**	0.002		**0.127**							**0.061**
		Sum of 2006 L	**0.164**	**0.103**	0.001					**0.060**				**0.057**
		Sum of 2007 L	**0.225**	**0.096**										**0.048**
		Sum of 2008 L	**0.326**	**0.070**										**0.043**
	SOL	Sum of 2003 L	0.009	**0.024**			**0.171**							**0.012**
		Sum of 2004 L	**0.026**	**0.022**	0.008		**0.067**							**0.015**
		Sum of 2005 L	**0.101**	**0.083**	0.007		**0.307**							**0.040**
		Sum of 2006 L	**0.103**	**0.070**	0.006					**0.103**				**0.041**
		Sum of 2007 L	**0.091**	**0.085**	0.006									**0.041**
		Sum of 2008 L	**0.121**	**0.055**	0.006					**0.041**				**0.034**
3b	ANF	Sum of 2003 L		**0.010**	**0.083**									**0.035**
		Sum of 2004 L		0.005	**0.133**									**0.061**
		Sum of 2005 L			**0.104**									**0.051**
		Sum of 2006 L			**0.067**									**0.027**
		Sum of 2007 L			**0.034**									**0.016**
		Sum of 2008 L			**0.044**									**0.018**
	HKE	Sum of 2003 L		**0.022**										0.010
		Sum of 2004 L		**0.019**										0.009
		Sum of 2005 L		**0.019**										0.008
		Sum of 2006 L		0.008									**1.000**	**0.027**
		Sum of 2007 L		0.003										0.001
		Sum of 2008 L		0.001										
	PLE	Sum of 2003 L			0.002									
		Sum of 2004 L			0.003									0.001
		Sum of 2005 L			0.004									0.002
		Sum of 2006 L			0.002									
		Sum of 2007 L			0.001									
		Sum of 2008 L												
	SOL	Sum of 2003 L			0.004									0.002
		Sum of 2004 L			0.009									0.004
		Sum of 2005 L			**0.014**									0.007
		Sum of 2006 L			0.008									0.003
		Sum of 2007 L		0.001	0.008									0.004
		Sum of 2008 L			0.007									0.003
BEAM	ANF	Sum of 2003 L												
		Sum of 2004 L								0.001				
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L					0.002							
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												

Table C.3. – Continued - Fleet specific landings of anglerfish, hake, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the Western Channel (2003-2008). Data from SGMOS-09-05.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
DEM_SEINE	ANF	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L										0.002		
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
DREDGE	ANF	Sum of 2003 L		0.003	0.001		0.002			0.004		**0.040**		0.003
		Sum of 2004 L		0.005	0.002					0.001		**0.660**		0.004
		Sum of 2005 L		0.006						**0.164**		**0.886**		0.005
		Sum of 2006 L		0.008					**1.000**			**0.715**		0.007
		Sum of 2007 L		**0.011**	0.001				**0.929**			**0.034**		0.007
		Sum of 2008 L	0.001	0.004								**0.095**		0.004
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L										0.002		
		Sum of 2005 L		0.002						**0.028**		0.005		0.001
		Sum of 2006 L										0.004		
		Sum of 2007 L												
		Sum of 2008 L			0.001							0.006		
	SOL	Sum of 2003 L			0.002							0.001		0.001
		Sum of 2004 L		0.001	0.002							**0.041**		0.001
		Sum of 2005 L		0.003	0.002					**0.017**		**0.094**		0.002
		Sum of 2006 L		0.002	0.001							**0.082**		0.002
		Sum of 2007 L		0.003	0.002				**0.071**			0.006		0.003
		Sum of 2008 L		0.002	0.004							**0.050**		0.003
GILL	ANF	Sum of 2003 L		0.001	**0.043**									**0.016**
		Sum of 2004 L		**0.013**	**0.092**									**0.047**
		Sum of 2005 L		**0.018**	**0.072**									**0.042**
		Sum of 2006 L		**0.010**	**0.060**									**0.030**
		Sum of 2007 L		**0.017**	**0.035**									**0.023**
		Sum of 2008 L		**0.014**	**0.042**									**0.024**
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												

Table C.3. – Continued - Fleet specific landings of anglerfish, hake, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the Western Channel (2003-2008). Data from SGMOS-09-05.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
LONGLINE	ANF	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	HKE	Sum of 2003 L												
		Sum of 2004 L											**1.000**	
		Sum of 2005 L											**1.000**	
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
none	ANF	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
OTTER	ANF	Sum of 2003 L		**0.019**	**0.289**									**0.114**
		Sum of 2004 L		**0.024**	**0.313**							**0.036**		**0.150**
		Sum of 2005 L		**0.032**	**0.335**							0.007		**0.174**
		Sum of 2006 L		**0.024**	**0.339**		**0.134**							**0.150**
		Sum of 2007 L		**0.046**	**0.370**		**0.011**							**0.187**
		Sum of 2008 L		**0.034**	**0.275**	**0.382**	**0.124**							**0.128**
	HKE	Sum of 2003 L		0.001	**0.035**									**0.013**
		Sum of 2004 L			**0.030**							0.002		**0.014**
		Sum of 2005 L		0.002	**0.032**									**0.016**
		Sum of 2006 L			**0.021**									0.009
		Sum of 2007 L			**0.015**									0.007
		Sum of 2008 L		0.002	**0.017**									0.008
	PLE	Sum of 2003 L		**0.016**	**0.021**									**0.015**
		Sum of 2004 L		**0.021**	**0.021**						**0.462**	**0.016**		**0.019**
		Sum of 2005 L	0.001	**0.025**	**0.022**									**0.020**
		Sum of 2006 L	0.002	**0.024**	**0.028**		**0.420**					0.004		**0.024**
		Sum of 2007 L	0.001	**0.022**	**0.025**		**0.391**							**0.021**
		Sum of 2008 L	0.004	**0.018**	**0.026**	**0.161**	**0.186**							**0.020**
	SOL	Sum of 2003 L		0.002	**0.032**									**0.013**
		Sum of 2004 L		0.003	**0.027**						**0.019**	0.004		**0.013**
		Sum of 2005 L		0.005	**0.035**									**0.019**
		Sum of 2006 L		0.004	**0.040**		**0.335**							**0.018**
		Sum of 2007 L		0.006	**0.038**		**0.196**							**0.020**
		Sum of 2008 L	0.002	0.004	**0.032**	**0.191**	**0.390**							**0.015**

Table C.3. – Continued - Fleet specific landings of anglerfish, hake, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the Western Channel (2003-2008). Data from SGMOS-09-05.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NIR	SCO	SPN	Grand Total
PEL_SEINE	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
PEL_TRAWL	ANF	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
POTS	ANF	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
TRAMMEL	ANF	Sum of 2003 L			**0.022**									0.008
		Sum of 2004 L			**0.036**									**0.016**
		Sum of 2005 L		0.002	**0.047**									**0.023**
		Sum of 2006 L		0.001	**0.052**									**0.021**
		Sum of 2007 L		0.001	**0.073**									**0.034**
		Sum of 2008 L		0.001	**0.089**									**0.036**
	HKE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	PLE	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												
	SOL	Sum of 2003 L												
		Sum of 2004 L												
		Sum of 2005 L												
		Sum of 2006 L												
		Sum of 2007 L												
		Sum of 2008 L												

ANNEX D: FISHERIES FOR SOLE AND PLAICE IN THE NORTH SEA

Table D.1. TACs and TAC uptake by country for plaice, sole and cod in the North Sea during the period 2006 to 2008.

2008:

PLE European plaice

2A3AX4 IV; EC waters of IIa; that part of IIIa not

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	3393,0		3.324,3	0,00	98,0 %	W	P
DNK	9090,0		8.213,9	0,00	90,4 %	W	
DEU	3183,0		2.988,8	0,00	93,9 %	W	
FRA	216,0		199,9	0,00	92,5 %	W	
NLD	20303,0		20.323,4	0,00	100,1 %	O	
SWE	0,0		0,0	0,00		!	
GBR	11690,0		11.070,7	0,00	94,7 %	W	
EEC	47875,0		46.121,0	0,00	96,3 %	W	
TAC	49000,0		46.121,0	0,00	94,1 %	W	

SOL Common sole

24. II, IV

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	1380,0		1.354,0	0,00	98,1 %	W	
DNK	677,0		492,2	0,00	72,7 %		
DEU	516,0		494,2	0,00	95,8 %	W	
FRA	919,0		796,4	0,00	86,7 %	W	
NLD	9974,0		9.422,5	0,00	94,5 %	W	
SWE	0,0		0,0	0,00		!	
GBR	930,0		832,8	0,00	89,5 %	W	
EEC	14395,0		13.392,1	0,00	93,0 %	W	
TAC	12800,0		13.392,1	0,00	104,6 %	O	

COD Atlantic cod

2A3AX4 IV; EC waters of IIa; that part of IIIa not

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	892,0		865,8	0,00	97,1 %	W	P
DNK	3906,0		3.827,0	0,00	98,0 %	W	
DEU	1867,0		1.725,8	0,00	92,4 %	W	
FRA	783,0		762,6	0,00	97,4 %	W	P
NLD	1952,0		1.876,1	0,00	96,1 %	W	
POL	2,0		1,0	0,00	50,0 %		
SWE	81,0		80,8	0,00	99,8 %	W	S
GBR	8746,0		8.707,6	0,00	99,6 %	W	
EEC	18386,0		17.846,7	0,00	97,1 %	W	
TAC	22152,0		17.846,7	0,00	80,6 %	W	

2007

PLE European plaice

2AC4. IV; EC waters of IIa

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	3872,0		3.853,3	0,00	99,5 %	W	S
DNK	9403,0		8.118,8	0,00	86,3 %	W	
DEU	2626,0		2.600,1	0,00	99,0 %	W	
FRA	287,0		222,7	0,00	77,6 %		
NLD	21449,0		21.427,5	0,00	99,9 %	W	
SWE	0,0		0,1	0,00		!	
GBR	11506,0		11.369,4	0,00	98,8 %	W	P
EEC	49143,0		47.591,9	0,00	96,8 %	W	
TAC	50261,0		47.591,9	0,00	94,7 %	W	

SOL Common sole

24. II, IV

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	1497,0		936,7	0,00	62,6 %		
DNK	702,0		415,3	0,00	59,2 %		
DEU	732,0		455,4	0,00	62,2 %		
FRA	629,0		447,2	0,00	71,1 %		
NLD	11887,0		10.348,8	0,00	87,1 %	W	
GBR	1406,0		1.190,7	0,00	84,7 %	W	
EEC	16853,0		13.794,1	0,00	81,8 %	W	
TAC	15020,0		13.794,1	0,00	91,8 %	W	

COD Atlantic cod

2AC4. IV; EC waters of IIa

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	937,0		998,6	0,00	106,6 %	O	S
DNK	3454,0		3.429,2	0,00	99,3 %	W	
DEU	1828,0		1.922,6	0,00	105,2 %	O	S
FRA	739,0		647,4	0,00	87,6 %	W	
NLD	1505,0		1.501,9	0,00	99,8 %	W	
SWE	37,0		36,5	0,00	98,6 %	W	S
GBR	8064,0		8.062,2	0,00	100,0 %	W	
EEC	16564,0		16.598,4	0,00	100,2 %	O	
TAC	19957,0		16.598,4	0,00	83,2 %	W	

2006

PLE European plaice

2AC4. IV; EC waters of IIa

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	3596,0		3.445,8	0,00	95,8 %	W	
DNK	11989,0		11.914,7	0,00	99,4 %	W	
DEU	3625,0		3.571,6	0,00	98,5 %	W	
FRA	444,0		161,9	0,00	36,5 %		
NLD	23515,0		22.697,7	0,00	96,5 %	W	
SWE	0,0		1,4	0,00		!	
GBR	12651,0		12.227,4	0,00	96,7 %	W	P
EEC	55820,0		54.020,5	0,00	96,8 %	W	
TAC	57441,0		54.020,5	0,00	94,0 %	W	

SOL Common sole

24. II, IV

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	1638,0		959,5	0,00	58,6 %		
DNK	841,0		573,6	0,00	68,2 %		
DEU	1091,0		469,6	0,00	43,0 %		
FRA	692,0		593,7	0,00	85,8 %	W	
NLD	13805,0		8.277,5	0,00	60,0 %		
SWE	0,0		0,0	0,00		!	
GBR	1262,0		897,5	0,00	71,1 %		
EEC	19329,0		11.771,4	0,00	60,9 %		
TAC	17670,0		11.771,4	0,00	66,6 %		

COD Atlantic cod

2AC4. IV; EC waters of IIa

Quota Country Code	Quota Adapted	Calculated Margin	Catches	SC Catches	%	Overfishing Level	Fishing Stop Flag
BEL	1324,0		1.281,1	0,00	96,8 %	W	P
DNK	5045,0		5.029,6	0,00	99,7 %	W	
DEU	2526,0		2.519,2	0,00	99,7 %	W	
FRA	402,0		346,6	0,00	86,2 %	W	
NLD	1575,0		1.574,8	0,00	100,0 %	W	
SWE	36,0		30,9	0,00	85,8 %	W	S
GBR	8352,0		8.294,0	0,00	99,3 %	W	
EEC	19260,0		19.076,2	0,00	99,0 %	W	
TAC	23205,0		19.076,2	0,00	82,2 %	W	

Table D.2. Trends in effort (kW*Days) of regulated and non-regulated gear in the North Sea by country (2003-2008). Data from SGMOS-09-05.

		COUNTRY															
GEAR	Data	BEL	DEN	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NED	NIR	POR	SCO	SPN	SWE	Grand Total
BEAM	Sum of 2000	390167	678016	573522	16238			6307123			5013587			9065			12987718
	Sum of 2001	463956	921654	638425	2243			6180615			5197903			5770			13410566
	Sum of 2002	335323	821216	659184	1882			6214085			5309688			16333			13357711
	Sum of 2003	392355	939807	616804	14428			6426101			5384651			1200			13775346
	Sum of 2004	317176	833899	376869	33671			6212126			5392813			31950			13198504
	Sum of 2005	329935	772877	372475	16563			6201722			5236236			8952			12938760
	Sum of 2006	324818	704537	196837	11834			6162892			5227769			8987			12637674
	Sum of 2007	350068	944602	366833	8656			6435155			5424683			6110			13536107
	Sum of 2008	356385	990405	358009	8671			6211260			5215828			884			13141442
BT1	Sum of 2000	2362246	110770	246330				1502			91720						2812568
	Sum of 2001	1878508	101605	524065				7947			179837						2691962
	Sum of 2002	1797995	1179534	2202520	303			113297			484240	750376		971920			7500185
	Sum of 2003	1036595	1498917	1060810				47736			581685	965239		866666			6057648
	Sum of 2004	1262243	1366044	671129				31698			708628	543305		694716			5277763
	Sum of 2005	1391340	1316858	618160				2128			744275	36825		730810			4840396
	Sum of 2006	1234613	788892	1321240				53986			1546520			603091			5548342
	Sum of 2007	1247506	856617	305837				30297			733878			349914			3524049
	Sum of 2008	948817	449199	228530				17674			370417			68568			2083205
BT2	Sum of 2000	6768007	1992238	8145405	554990		2371	2459026			59427950	508905		5345438			85204330
	Sum of 2001	6879374	1913399	7738242	758752		4882	2133383			56053016	775217		6049219			82305484
	Sum of 2002	6875041	583988	3876855	940244		1956	1873683			51893123	23215		4584209			70652314
	Sum of 2003	6824266	116717	3572791	795747		5180	1669870			47910055	20350		3766255			64681231
	Sum of 2004	6127977	87890	4230884	628661		14375	2080593			44894068	47517		4610314			62722279
	Sum of 2005	5486958	100871	4470070	659818		8180	2212397			44569073	16785		4185264			61709416
	Sum of 2006	5720243	92798	3333673	657458			1927398			39078154			3109683			53919407
	Sum of 2007	5395452	104694	3576089	606739			1590823			38121641			2800641			52196079
	Sum of 2008	5812071	39730	2332746	517004			1464163			27648790			1354776			39169280
DEM_SEINE	Sum of 2000		18746											13955		336	33037
	Sum of 2001		1045								4944			12707			18696
	Sum of 2002		3501	102							208			9470		112	13393
	Sum of 2003		7932								1323			17167			26422
	Sum of 2004			448										9270			9718
	Sum of 2005			358										22780			23138
	Sum of 2006		71					436						1710		368	2585
	Sum of 2007										1835			11182			13017
	Sum of 2008										2708			2138		368	5214
DREDGE	Sum of 2000		713392	566756	6478			282284			20957			1405892			2995759
	Sum of 2001		733501	457332			212	93706	1323		17800			1256683			2560557
	Sum of 2002		713457	479025	8193		1484	110614			24724			1046166			2383663
	Sum of 2003		738950	601042	32509			387677		139925	300672			1499738			3700513
	Sum of 2004		680003	473965	72610			328048		208062	167774			2174726			4105188
	Sum of 2005		519533	523965	89295			160077	11297	51300	127961	259		1607320			3091007
	Sum of 2006		383751	449353	17255			9429	32920		244658			1679565			2816931
	Sum of 2007	1882	438304	569827	12321			183894	44610		244635			1893820			3389293
	Sum of 2008	14902	358259	572143	16477			43773	37483		286526			1569186			2898749
GN1	Sum of 2000	61831	4705094	753234	236726			201693			191569			32240		74029	6256416
	Sum of 2001	102091	4440151	732539	257115			125444			177290			63254		81638	5979522
	Sum of 2002	93282	3809195	556773	293501			127983			231998			47377		86574	5246683
	Sum of 2003	128220	2556357	342138	367373			191424			460895			196852		102519	4345778
	Sum of 2004	106717	2503663	362507	218448			163665			416025			197407		127286	4095718
	Sum of 2005	108149	2355996	308493	159506			273203			387945			165644		89748	3848684
	Sum of 2006	99327	2086501	311045	64292			236585			512022			293823		76409	3680004
	Sum of 2007	69973	1234706	182202	89113			152633			521697			320785		58618	2629727
	Sum of 2008	94133	1328785	75938	101614			281182			507733			417076		96877	2903338
GT1	Sum of 2000		84092	64466	920011											15487	1084056
	Sum of 2001		128756	63557	1255594											14298	1462205
	Sum of 2002		142976	46573	1962863											16562	2168974
	Sum of 2003		143427	12387	1834090								179			13801	2003884
	Sum of 2004		246854	10306	2038422											16206	2311788
	Sum of 2005		240716	14525	1984944											27824	2268009
	Sum of 2006		184802	17181	1111667			1547								56771	1371968
	Sum of 2007	39856	98425	10999	1209694											62309	1421283
	Sum of 2008	32571	126223	22498	1637746						740					63022	1882800
LL1	Sum of 2000		297384	386865	958									78368		11727	775302
	Sum of 2001		370229	158207	5966									88759		32712	655873
	Sum of 2002		299245	324102	51563							8856		104086		44736	832588
	Sum of 2003		128989	147068	35140									57163		32305	400665
	Sum of 2004		85345	115019	25594									4350		44221	274529
	Sum of 2005		44687	182590	23063											42904	293244
	Sum of 2006		38903	95139	5011									7542		123481	270076
	Sum of 2007		18078	53675	10351									1487	735	165019	249345
	Sum of 2008	1833	27772	45554	70857									276674		53381	476071
none	Sum of 2000		94406	85	1518									27421			123430
	Sum of 2001		131819	585	8244									16097			156745
	Sum of 2002		145068		448									16558			162074
	Sum of 2003		237970	975	94710									14027			347682
	Sum of 2004		186725		201850									23169			411744
	Sum of 2005		218454		1008									30090			249552
	Sum of 2006		253444		6108									28508			288060
	Sum of 2007		663032		2723									37605			703360
	Sum of 2008	61	483403	246	28003									44722			556435
OTTER	Sum of 2000	988347	10475820	20280	34428					27000	276451			583743		2667993	15074062
	Sum of 2001	860644	12254427	31753	5347					39080	136004			369022		3066266	16762543
	Sum of 2002	650418	10059335	24195	21793					10500	85872	660		434262		2826512	14113547
	Sum of 2003	549116	10384251	21751	202402			109150		5344	134414			545510		2832417	14784355
	Sum of 2004		9930195	71009	401238			78875			17329			765990		3088476	14353112
	Sum of 2005		6074392	205188	296089			10782		32520	8749			570700		2170140	9368560
	Sum of 2006		6022247	234755	112869			48072			221	272		284732		2208858	8912026
	Sum of 2007		3880697	25843	68664			14680			11187	6494		317093		1587401	5912059
	Sum of 2008		5868423	53290	36090			44061		10070		1472		377965		1860216	8251587

Table D.2. Continued – Trends in effort (kW*Days) of regulated and non-regulated gear in the North Sea by country (2003-2008). Data from SGMOS-09-05.

		COUNTRY															
GEAR	Data	BEL	DEN	ENG	FRA	GBG	GBJ	GER	IOM	IRL	NED	NIR	POR	SCO	SPN	SWE	Grand Total
PEL_SEINE	Sum of 2000		1809884									59330		551711		394458	2815383
	Sum of 2001		1550207								13584	220796		154725		269620	2208932
	Sum of 2002		1609191								9960	123386		20765		204633	1967935
	Sum of 2003		1968479								19679	181832				161121	2331111
	Sum of 2004		2080089								9200	188326				121333	2398948
	Sum of 2005		1974343								14055	129880				249080	2367358
	Sum of 2006		1385757								13523	159103		3036		200832	1762251
	Sum of 2007		935968								8992	126633				119760	1191353
	Sum of 2008		832090								11587					143380	987057
PEL_TRAWL	Sum of 2000		3111415	819083	69466			1298721		235092	5384948	57167		3586090		599800	15161782
	Sum of 2001		3869997	1302099	124295			1355503		285356	5482266	6647		3101720		537052	16064935
	Sum of 2002		4408566	1418413	236056			1361294		475429	5871965	125566		4174590		1065594	19137473
	Sum of 2003		4416409	1478725	244811			1735237		539331	7209775	152113		4473776		881536	21131713
	Sum of 2004		4130089	1562010	79687			1667716		580137	7265714	102623		4485611		585129	20458716
	Sum of 2005		2987314	1631712	79855			1735139		403494	6025778	50103		2596357		682213	16191965
	Sum of 2006		3323479	1240943	79256			1397555		206147	5000291	57356		2021581		442878	13769486
	Sum of 2007		2816299	1566161	45285			654151		375374	4946137	83469		1999286		445536	12931698
	Sum of 2008		1635194	1092572	54517			680308		361835	2923426	38030		1264913		255416	8306211
POTS	Sum of 2000		1062	1402317	10911	39233	108399					1407		957168		162588	2683085
	Sum of 2001			1483808	9072	36568	113180				5326			937277		199789	2785020
	Sum of 2002			1482278	2682	27747	49931				4562			974594		234714	2776508
	Sum of 2003		3225	1777397	2489	38013	67837				2822			948919		241592	3082294
	Sum of 2004		8168	1622481		38467	82496				876			967366		291545	3011399
	Sum of 2005		4644	1674995	4411	33150	76607			25334	9569			885668		322315	3036693
	Sum of 2006		4760	1561894	1235	63737	67282	3234		148673	624			856992		365875	3074306
	Sum of 2007		29362	1716877	3116	16061	39276			203334	3616			846759		416564	3274965
	Sum of 2008		20435	1532823		59251	10742			172342	4030			999028		539147	3337798
TR1	Sum of 2000		11448651	5137352	2627750		15071	2140449			2256096			33780359		1498271	58903999
	Sum of 2001		11763130	4406302	2928730			1864235			1493945	5500		30661895		1510948	54634685
	Sum of 2002		11946095	3530732	3931684		11704	2262351			1522082	4235		24340540		1297755	48847178
	Sum of 2003		8114872	2375456	3485849			1895838		1847	711764			16108435		553332	33247393
	Sum of 2004	1479	7214293	1498089	2638273			1722372			608132	16948		12687948		470803	26858337
	Sum of 2005		7909215	1256186	2389975			2173634			559719	70711		12166826		496754	27023020
	Sum of 2006		7449778	1824680	2698570			2466715		1044	547288	51951		11663858		292520	26996404
	Sum of 2007	154649	5477578	1500010	2369516			2041064			658060	61460		11022980	9390	357841	23652548
	Sum of 2008	191516	5355371	1851664	2571646			1791607			1413253	49104		12176291	2254	426261	25828967
TR2	Sum of 2000		5937085	1284006	6464144		32102	256294	272		606370			4878419		2492233	21950925
	Sum of 2001		5359627	1165982	9941430	3977	42567	263592			958182	7480		5351836		2457593	25552266
	Sum of 2002		6655194	1117646	12267246		19716	299432			1211998	23293		8545190		2474133	32613848
	Sum of 2003		7760038	2098696	12871225		27897	1040874		54	2096990	6784		10080830		2123156	38106544
	Sum of 2004	496555	8329649	1976703	12446186		20201	905330		884	1817806	12440		9515699		1955220	37476673
	Sum of 2005	320116	5924218	2187325	11748308		25653	704404			1651363	221904		9108230		1972039	33863560
	Sum of 2006	344889	4692537	1892451	10882118		15391	771597			1517769	532885		8677821		2116735	31444193
	Sum of 2007	274177	3455982	1769019	9631715		19560	680681		73170	1820602	758972		8887263		2055318	29426459
	Sum of 2008	405851	3358302	1956686	8638887		14109	457259			2488314	409182		9203473		2100952	29033015
TR3	Sum of 2000		6835856	19391	12426			1783			57584			106760		121644	7155444
	Sum of 2001		4901394	29387	5187			4560			52195			6521		316124	5315368
	Sum of 2002		5365758	15361	8960			380			79073					200433	5669965
	Sum of 2003		4876431	66951	29893			1028			80745			6377		207504	5268929
	Sum of 2004		5127600	21003	24083						48611	7680		5460		275489	5509926
	Sum of 2005		4614582	16312	23967						54505			2356		338638	5050360
	Sum of 2006		3431887	11607	3166			10502			42407			116		238150	3737835
	Sum of 2007		2165033	2994	5844			884			28840			72821		214527	2490943
	Sum of 2008	374	1877245	2870	10662			4410			21582					100216	2017359

Table D.3. Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (cod, plaice and sole) in the North Sea. Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
BEAM	COD	Sum of 2003 L	35	0	2	0		1		43				81
		Sum of 2004 L	21		0	0		1		26		1		50
		Sum of 2005 L	18	0	1	1		0		13		0		33
		Sum of 2006 L	12	0	0	0		1		21		0		36
		Sum of 2007 L	22		0	1		1		30				54
		Sum of 2008 L	30			0		2		41				72
	PLE	Sum of 2003 L	30	3	176	7		17		121				354
		Sum of 2004 L	12		19	13		3		89		28		163
		Sum of 2005 L	12	2	27	13		0		81		11		145
		Sum of 2006 L	7	1	25	3		1		30		9		75
		Sum of 2007 L	5		4	3		4		105		22		143
		Sum of 2008 L	6			4		1		0		0		12
	SOL	Sum of 2003 L	20	0	7	26		13		46				112
		Sum of 2004 L	7		4	21		6		27		0		65
		Sum of 2005 L	9		1	12		1		18		0		40
		Sum of 2006 L	4	0	0	7		2		10				22
		Sum of 2007 L	6		3	4		6		39				57
		Sum of 2008 L	5			7		5		4		0		21
BT1	COD	Sum of 2003 L	492	98	29			3		33	14	38		708
		Sum of 2004 L	953	140	24			2		104	11	52		1285
		Sum of 2005 L	901	159	16			0		324	1	35		1436
		Sum of 2006 L	815	90	39			6		176		39		1164
		Sum of 2007 L	586	57	10			3		89		31		775
		Sum of 2008 L	295	36	2			4		38		0		375
	PLE	Sum of 2003 L	1016	2837	1316			35		534	997	950		7685
		Sum of 2004 L	1310	2681	910			34		636	642	600		6812
		Sum of 2005 L	1057	2616	816			2		854	28	584		5956
		Sum of 2006 L	1518	2783	1966			297		2051		1097		9711
		Sum of 2007 L	2051	1830	675			117		984		568		6225
		Sum of 2008 L	1280	904	603			56		603		169		3615
	SOL	Sum of 2003 L	15	16	8			10		9	36	12		105
		Sum of 2004 L	19	24	3			0		8	17	5		76
		Sum of 2005 L	7	17	4			0		6	3	5		43
		Sum of 2006 L	16	16	7			3		12		8		62
		Sum of 2007 L	7	16	1			0		5		6		35
		Sum of 2008 L	10	11	2			1		12		0		36
BT2	COD	Sum of 2003 L	709	11	97	12	0	65		1367	2	169		2431
		Sum of 2004 L	429	5	83	6	0	51		928	2	123		1626
		Sum of 2005 L	446	11	114	3	0	53		915	1	89		1630
		Sum of 2006 L	431	4	96	6		48		958		86		1629
		Sum of 2007 L	343	4	85	15		22		932		54		1455
		Sum of 2008 L	561	8	63	8		27		1059		39		1766
	PLE	Sum of 2003 L	4035	247	3823	659	1	1325		26782	30	4465		41366
		Sum of 2004 L	3532	118	4997	485	0	1798		23303	82	5835		40151
		Sum of 2005 L	2750	220	4690	425	1	1634		21235	24	4639		35618
		Sum of 2006 L	2618	386	3262	339		1153		20578		3475		31812
		Sum of 2007 L	2765	460	4374	387		812		20624		3468		32889
		Sum of 2008 L	3035	146	3733	347		815		16968		2434		27480
	SOL	Sum of 2003 L	3081	4	934	568	10	583		12384	2	238		17804
		Sum of 2004 L	2780	1	975	493	14	815		12736	2	351		18168
		Sum of 2005 L	2457	2	609	369	10	612		10839	1	361		15260
		Sum of 2006 L	2415	0	499	324		362		8162		332		12095
		Sum of 2007 L	2365	3	574	377		341		10128		511		14299
		Sum of 2008 L	2518	1	443	378		322		9098		231		12990
DEM_SEINE	COD	Sum of 2003 L		1								0		1
		Sum of 2004 L										0		0
		Sum of 2005 L										2		2
		Sum of 2006 L		0				3						3
		Sum of 2007 L										1		1
		Sum of 2008 L												0
	PLE	Sum of 2003 L		4								0		5
		Sum of 2004 L												0
		Sum of 2005 L										0		0
		Sum of 2006 L		1				5						6
		Sum of 2007 L												0
		Sum of 2008 L												0

Table D.3. – Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (cod, plaice and sole) in the North Sea. Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
	SOL	Sum of 2003 L		0										0
		Sum of 2004 L												0
		Sum of 2005 L												0
		Sum of 2006 L												0
		Sum of 2007 L												0
		Sum of 2008 L												0
DREDGE	COD	Sum of 2003 L		0	0	0			0			0		0
		Sum of 2004 L		1	0	0								1
		Sum of 2005 L			0	0					0			0
		Sum of 2006 L			0							1		1
		Sum of 2007 L		1	0	1						1		4
		Sum of 2008 L		0	0	0						0		1
	PLE	Sum of 2003 L		1	2	1			0			0		5
		Sum of 2004 L		1	1	1			1			0		4
		Sum of 2005 L			2	15			0					17
		Sum of 2006 L			2	5						0		7
		Sum of 2007 L	0		1	2						0		3
		Sum of 2008 L	1	3	1	1						1		7
	SOL	Sum of 2003 L		0	2	1			0			0		3
		Sum of 2004 L			1	1			1			0		3
		Sum of 2005 L			2	16			0		0			19
		Sum of 2006 L			1	4						0		5
		Sum of 2007 L	0		4	0						0		4
		Sum of 2008 L	0	0	1	2						1		4
GN1	COD	Sum of 2003 L	94	2588	314	263		126		114		13	10	3522
		Sum of 2004 L	35	3257	351	96		273		101		13	13	4137
		Sum of 2005 L	23	3138	206	84		270		57		6	16	3800
		Sum of 2006 L	25	2667	223	153		159		92		4	14	3338
		Sum of 2007 L	21	1917	117	208		159		50		2	5	2479
		Sum of 2008 L	30	1973	237	113		155		70		3	4	2585
	PLE	Sum of 2003 L	7	4393	1	76		22		1		0	2	4501
		Sum of 2004 L	4	2872	1	59		15		4			7	2963
		Sum of 2005 L	4	2652	1	64		13		1			2	2736
		Sum of 2006 L	5	2878	0	18		15		2		0	0	2918
		Sum of 2007 L	4	1447	1	58		13		1			0	1523
		Sum of 2008 L	4	1695	1	22		9		1			0	1731
	SOL	Sum of 2003 L	34	538	2	249		74		0			0	898
		Sum of 2004 L	49	489	1	167		90		86			0	882
		Sum of 2005 L	52	571	1	86		120		84			0	914
		Sum of 2006 L	44	532	1	34		96		125			0	834
		Sum of 2007 L	22	345	5	91		73		166			0	703
		Sum of 2008 L	51	429	5	89		145		200			0	918
GT1	COD	Sum of 2003 L		121	1	372							4	498
		Sum of 2004 L		195	1	135							8	340
		Sum of 2005 L		178	3	156							5	343
		Sum of 2006 L		114	7	222							1	344
		Sum of 2007 L	5	44	4	287							6	346
		Sum of 2008 L	7	112	11	235				3			7	376
	PLE	Sum of 2003 L		541	4	455							1	1001
		Sum of 2004 L		724	3	544							2	1272
		Sum of 2005 L		1061	4	390							7	1462
		Sum of 2006 L		984	3	344							9	1340
		Sum of 2007 L	2	548	3	425							9	987
		Sum of 2008 L	1	319	3	330							10	663
	SOL	Sum of 2003 L		27	3	2094								2124
		Sum of 2004 L		44	4	1902								1951
		Sum of 2005 L		45	4	2120								2169
		Sum of 2006 L		13	6	1992							0	2011
		Sum of 2007 L	47	21	4	2090							0	2162
		Sum of 2008 L	26	24	5	1999							0	2055

Table D.3. – Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (cod, plaice and sole) in the North Sea. Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
LL1	COD	Sum of 2003 L		152	26	5						18	10	211
		Sum of 2004 L		91	16	9						1	10	127
		Sum of 2005 L		73	14	4							19	109
		Sum of 2006 L		82	17	4						1	18	121
		Sum of 2007 L		20	8	4							80	112
		Sum of 2008 L	0	27	4	4						4	56	95
	PLE	Sum of 2003 L		1	0	0								1
		Sum of 2004 L		11	0									11
		Sum of 2005 L		1	0									1
		Sum of 2006 L		1	1									2
		Sum of 2007 L		0	0	0							0	0
		Sum of 2008 L		0	0	0								0
	SOL	Sum of 2003 L		0	0									0
		Sum of 2004 L		0	0									0
		Sum of 2005 L		0										0
		Sum of 2006 L		0	0	0								0
		Sum of 2007 L												0
		Sum of 2008 L				0								0
none	COD	Sum of 2003 L		33		1				99				134
		Sum of 2004 L		36		5				72				113
		Sum of 2005 L		30						42				72
		Sum of 2006 L		24						77				101
		Sum of 2007 L	1	12		0				160				173
		Sum of 2008 L		12		27				205		5		250
	PLE	Sum of 2003 L		56		14				155				225
		Sum of 2004 L		30		29				137				197
		Sum of 2005 L		26		0				115				141
		Sum of 2006 L		23		0				126				150
		Sum of 2007 L		63		0				134				197
		Sum of 2008 L		14		4				291				309
	SOL	Sum of 2003 L		4		46				39				89
		Sum of 2004 L		8		50				21				79
		Sum of 2005 L		0		1				16				17
		Sum of 2006 L		1		2				13				15
		Sum of 2007 L		1		1				21				23
		Sum of 2008 L		1		10				17				28
OTTER	COD	Sum of 2003 L	97	207	4	6		1	0			1	35	351
		Sum of 2004 L		206	12	9						2	47	276
		Sum of 2005 L	1	184	5	7		0				1	90	289
		Sum of 2006 L		147	0	5					0	0	61	214
		Sum of 2007 L		55	0	17						2	44	118
		Sum of 2008 L		76		4					0	2	60	142
	PLE	Sum of 2003 L	325	9	0	29		0	0			0	0	365
		Sum of 2004 L		18	0	67						0	1	86
		Sum of 2005 L		19	1	47		0				0	4	71
		Sum of 2006 L		2	0	33					0	4	4	43
		Sum of 2007 L		9	0	6						9	3	27
		Sum of 2008 L		7		3					0	0	4	15
	SOL	Sum of 2003 L	58	0	0	38			0				0	96
		Sum of 2004 L		0	0	73							0	73
		Sum of 2005 L		0	0	60							0	60
		Sum of 2006 L		0	0	55						0	0	55
		Sum of 2007 L		0	0	23						0	0	23
		Sum of 2008 L		0		19							0	19
PEL_TRAWL	COD	Sum of 2003 L		1		8								9
		Sum of 2004 L		0		1								1
		Sum of 2005 L		0		0								0
		Sum of 2006 L		2		1								4
		Sum of 2007 L		1	0	2								3
		Sum of 2008 L		3		2								4

Table D.3. – Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (cod, plaice and sole) in the North Sea. Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
	PLE	Sum of 2003 L		0		14								14
		Sum of 2004 L		0		12								12
		Sum of 2005 L				10								10
		Sum of 2006 L		0	0	4								4
		Sum of 2007 L				1								1
		Sum of 2008 L		0		8								8
	SOL	Sum of 2003 L		0		23								23
		Sum of 2004 L				15								15
		Sum of 2005 L				10								10
		Sum of 2006 L		0		12								12
		Sum of 2007 L				2								2
		Sum of 2008 L				8								8
POTS	COD	Sum of 2003 L		0	12							2	0	14
		Sum of 2004 L		0	12							4	0	16
		Sum of 2005 L		0	14	0						3	0	17
		Sum of 2006 L			11	2						3	0	15
		Sum of 2007 L			11	1						0	0	11
		Sum of 2008 L			7								0	7
	PLE	Sum of 2003 L		0	0	0								0
		Sum of 2004 L			0									0
		Sum of 2005 L		0	0	0								1
		Sum of 2006 L			0	1								1
		Sum of 2007 L			0	1						0		1
		Sum of 2008 L		0	0									0
	SOL	Sum of 2003 L		0	0	0							0	0
		Sum of 2004 L			0									0
		Sum of 2005 L			0	0								0
		Sum of 2006 L			0	0								0
		Sum of 2007 L			0	2								2
		Sum of 2008 L		0	0								0	0
TR1	COD	Sum of 2003 L		2047	1078	93		1724	0	473		6558	57	12029
		Sum of 2004 L	4	1936	1035	29		1843		388	1	5617	25	10879
		Sum of 2005 L		2836	659	26		2282		206	7	5707	32	11756
		Sum of 2006 L		2139	794	122		2330		209	2	5927	18	11540
		Sum of 2007 L	14	2027	825	210		1740		178	7	5819	22	10842
		Sum of 2008 L	8	2472	866	114		1553		348	8	6344	30	11743
	PLE	Sum of 2003 L		5017	480	6		341		172		1027	4	7047
		Sum of 2004 L		6099	605	1		210		125	0	920	2	7962
		Sum of 2005 L		6557	228	1		242		160	3	869	4	8065
		Sum of 2006 L		8446	847	2		938		206	1	1156	1	11597
		Sum of 2007 L	152	7223	708	5		600		209	3	980	1	9881
		Sum of 2008 L	182	9906	1193	3		1379		1234	2	1913	28	15842
	SOL	Sum of 2003 L		20	6	1		1		1		1		30
		Sum of 2004 L		16	3	0		0		0		1	0	21
		Sum of 2005 L		15	2	0		1		0	0	1	0	19
		Sum of 2006 L		23	4	2		1		0	0	0	0	31
		Sum of 2007 L	0	23	5	0		0		1	0	0	0	29
		Sum of 2008 L	0	25	6	2		1		2		2	0	37
TR2	COD	Sum of 2003 L		1495	212	1254	1	189		227	1	944	385	4708
		Sum of 2004 L	40	1644	155	668	0	147	0	146	1	766	363	3929
		Sum of 2005 L	33	1248	176	767	0	131		131	26	779	287	3576
		Sum of 2006 L	31	1101	185	779	0	69		113	31	651	230	3189
		Sum of 2007 L	33	728	173	1295	1	50		166	36	606	187	3275
		Sum of 2008 L	70	784	169	1125	1	51		170	21	515	186	3093
	PLE	Sum of 2003 L		4601	675	1440	1	2070	0	958	0	372	136	10253
		Sum of 2004 L	237	4566	633	1299	0	1666	0	805	0	263	158	9629
		Sum of 2005 L	185	1921	678	1088	0	1505		773	5	261	108	6523
		Sum of 2006 L	236	1748	489	873	0	1205		1032	11	230	151	5977
		Sum of 2007 L	129	1324	583	858	0	1052		1125	18	276	140	5505
		Sum of 2008 L	140	1247	970	754	0	824		1625	10	541	172	6282

Table D.3. – Continued - Trends in reported landings (tonnes) for regulated and non-regulated gear by country of important catch species (cod, plaice and sole) in the North Sea. Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
	SOL	Sum of 2003 L		64	45	710	0	71		97		2	1	991
		Sum of 2004 L	76	111	36	534	0	42	0	17	0	2	3	821
		Sum of 2005 L	66	94	47	388	0	26		18	0	1	6	646
		Sum of 2006 L	57	58	60	523	0	13		18	1	4	5	740
		Sum of 2007 L	52	24	65	603	0	20		38	0	6	6	814
		Sum of 2008 L	127	35	95	516	0	26		93	0	8	2	902
TR3	COD	Sum of 2003 L		51	0	1		0		4				57
		Sum of 2004 L		28		0				1		1	0	30
		Sum of 2005 L		39		1				1			0	41
		Sum of 2006 L		32						0				32
		Sum of 2007 L		5	0	0				0				5
		Sum of 2008 L		57		1				0				57
	PLE	Sum of 2003 L		42	0	4		0		0				46
		Sum of 2004 L		20		6				0				25
		Sum of 2005 L		19	0	2				0		0	0	21
		Sum of 2006 L		23	0	1		10		0				34
		Sum of 2007 L		6	0	1				1				8
		Sum of 2008 L		0		1				0				1
	SOL	Sum of 2003 L		1	0	6		0		0				6
		Sum of 2004 L		0		1				0				1
		Sum of 2005 L		0	0	3				0				3
		Sum of 2006 L		0		1		0		0				2
		Sum of 2007 L		0		1				0				1
		Sum of 2008 L				7				0				7

Table D.4. – Fleet specific landings of cod, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the North Sea (2003-2008). Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
BEAM	COD	Sum of 2003	0.003											
		Sum of 2004	0.002											
		Sum of 2005	0.002											
		Sum of 2006	0.001											
		Sum of 2007	0.002											
		Sum of 2008	0.003							0.001				
	PLE	Sum of 2003	0.003		0.007					0.003				
		Sum of 2004	0.001							0.002				
		Sum of 2005	0.001		0.001					0.002				
		Sum of 2006												
		Sum of 2007								0.003				
		Sum of 2008												
	SOL	Sum of 2003	0.002							0.001				
		Sum of 2004												
		Sum of 2005	0.001											
		Sum of 2006												
		Sum of 2007								0.001				
		Sum of 2008												
BT1	COD	Sum of 2003	**0.044**		0.001						0.003			0.002
		Sum of 2004	**0.091**							0.003	0.003			0.003
		Sum of 2005	**0.103**	0.002						0.009				0.004
		Sum of 2006	**0.091**	0.001	0.002					0.005				0.004
		Sum of 2007	**0.063**							0.003				0.002
		Sum of 2008	**0.032**							0.001				0.001
	PLE	Sum of 2003	**0.091**	**0.022**	**0.055**			0.001		**0.012**	**0.191**	0.008		**0.018**
		Sum of 2004	**0.125**	**0.017**	**0.036**			0.001		**0.016**	**0.147**	0.005		**0.015**
		Sum of 2005	**0.121**	**0.025**	**0.033**					**0.024**	0.008	0.005		**0.016**
		Sum of 2006	**0.170**	**0.036**	**0.079**			**0.011**		**0.060**		**0.010**		**0.030**
		Sum of 2007	**0.219**	**0.029**	**0.023**			0.005		**0.028**		0.005		**0.019**
		Sum of 2008	**0.140**	**0.014**	**0.025**			0.002		**0.019**		0.001		**0.011**
	SOL	Sum of 2003	0.001								0.007			
		Sum of 2004	0.002								0.004			
		Sum of 2005									0.001			
		Sum of 2006	0.002											
		Sum of 2007												
		Sum of 2008	0.001											
BT2	COD	Sum of 2003	**0.063**		0.004		0.001	0.002		**0.031**		0.001		0.006
		Sum of 2004	**0.041**		0.003		0.001	0.002		**0.023**				0.004
		Sum of 2005	**0.051**		0.005		0.004	0.002		**0.025**				0.004
		Sum of 2006	**0.048**		0.004			0.002		**0.028**				0.005
		Sum of 2007	**0.037**		0.003					**0.026**				0.004
		Sum of 2008	**0.062**		0.003					**0.033**				0.005
	PLE	Sum of 2003	**0.361**	0.002	**0.159**	**0.016**	**0.038**	**0.050**		**0.613**	0.006	**0.039**		**0.099**
		Sum of 2004	**0.336**		**0.197**	**0.015**	**0.028**	**0.062**		**0.586**	**0.019**	**0.046**		**0.090**
		Sum of 2005	**0.315**	0.002	**0.192**	**0.016**	**0.086**	**0.058**		**0.592**	0.007	**0.038**		**0.096**
		Sum of 2006	**0.294**	0.005	**0.131**	**0.010**		**0.042**		**0.605**		**0.032**		**0.097**
		Sum of 2007	**0.295**	0.007	**0.146**	**0.013**		**0.031**		**0.586**		**0.030**		**0.099**
		Sum of 2008	**0.333**	0.002	**0.156**	**0.011**		**0.030**		**0.529**		**0.021**		**0.085**
	SOL	Sum of 2003	**0.275**		**0.039**	**0.014**	**0.473**	**0.022**		**0.283**		0.002		**0.043**
		Sum of 2004	**0.264**		**0.039**	**0.015**	**0.903**	**0.028**		**0.320**		0.003		**0.041**
		Sum of 2005	**0.282**		**0.025**	**0.014**	**0.773**	**0.022**		**0.302**		0.003		**0.041**
		Sum of 2006	**0.271**		**0.020**	0.010		**0.013**		**0.240**		0.003		**0.037**
		Sum of 2007	**0.252**		**0.019**	**0.012**		**0.013**		**0.288**		0.004		**0.043**
		Sum of 2008	**0.276**		**0.018**	**0.012**		**0.012**		**0.284**		0.002		**0.040**

Table D.4. Continued – Fleet specific landings of cod, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the North Sea (2003-2008). Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
DEM_SEINE	COD	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	PLE	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
DREDGE	COD	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	PLE	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
GN1	COD	Sum of 2003	0.008	**0.020**	**0.013**	0.006		0.005		0.003			0.004	0.008
		Sum of 2004	0.003	**0.020**	**0.014**	0.003		0.009		0.003			0.005	0.009
		Sum of 2005	0.003	**0.030**	0.008	0.003		0.010		0.002			0.007	**0.010**
		Sum of 2006	0.003	**0.034**	0.009	0.005		0.006		0.003			0.005	**0.010**
		Sum of 2007	0.002	**0.031**	0.004	0.007		0.006		0.001			0.002	0.007
		Sum of 2008	0.003	**0.030**	0.010	0.004		0.006		0.002			0.002	0.008
	PLE	Sum of 2003		**0.034**		0.002								**0.011**
		Sum of 2004		**0.018**		0.002							0.003	0.007
		Sum of 2005		**0.026**		0.002								0.007
		Sum of 2006		**0.037**										0.009
		Sum of 2007		**0.023**		0.002								0.005
		Sum of 2008		**0.026**										0.005
	SOL	Sum of 2003	0.003	0.004		0.006		0.003						0.002
		Sum of 2004	0.005	0.003		0.005		0.003		0.002				0.002
		Sum of 2005	0.006	0.006		0.003		0.004		0.002				0.002
		Sum of 2006	0.005	0.007		0.001		0.003		0.004				0.003
		Sum of 2007	0.002	0.006		0.003		0.003		0.005				0.002
		Sum of 2008	0.006	0.007		0.003		0.005		0.006				0.003

Table D.4. Continued – Fleet specific landings of cod, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the North Sea (2003-2008). Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
GT1	COD	Sum of 2003				0.009							0.002	0.001
		Sum of 2004		0.001		0.004							0.003	
		Sum of 2005		0.002		0.006							0.002	
		Sum of 2006		0.001		0.007								0.001
		Sum of 2007				0.010							0.002	0.001
		Sum of 2008		0.002		0.007							0.003	0.001
	PLE	Sum of 2003		0.004		**0.011**								0.002
		Sum of 2004		0.005		**0.017**								0.003
		Sum of 2005		**0.010**		**0.015**							0.003	0.004
		Sum of 2006		**0.013**		**0.010**							0.003	0.004
		Sum of 2007		0.009		**0.014**							0.004	0.003
		Sum of 2008		0.005		**0.011**							0.004	0.002
	SOL	Sum of 2003				**0.050**								0.005
		Sum of 2004				**0.060**								0.004
		Sum of 2005				**0.079**								0.006
		Sum of 2006				**0.061**								0.006
		Sum of 2007	0.005			**0.069**								0.007
		Sum of 2008	0.003			**0.064**								0.006
LL1	COD	Sum of 2003		0.001	0.001								0.004	
		Sum of 2004											0.004	
		Sum of 2005											0.008	
		Sum of 2006		0.001									0.007	
		Sum of 2007											**0.035**	
		Sum of 2008											**0.023**	
	PLE	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
none	COD	Sum of 2003								0.002				
		Sum of 2004								0.002				
		Sum of 2005								0.001				
		Sum of 2006								0.002				
		Sum of 2007								0.005				
		Sum of 2008								0.006				
	PLE	Sum of 2003								0.004				
		Sum of 2004								0.003				
		Sum of 2005								0.003				
		Sum of 2006								0.004				
		Sum of 2007		0.001						0.004				
		Sum of 2008								0.009				
	SOL	Sum of 2003				0.001								
		Sum of 2004				0.002								
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												

Table D.4. Continued – Fleet specific landings of cod, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the North Sea (2003-2008). Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
OTTER	COD	Sum of 2003	0.009	0.002									**0.014**	
		Sum of 2004		0.001									**0.017**	
		Sum of 2005		0.002									**0.039**	
		Sum of 2006		0.002									**0.023**	
		Sum of 2007											**0.019**	
		Sum of 2008		0.001									**0.025**	
	PLE	Sum of 2003	**0.029**											
		Sum of 2004				0.002								
		Sum of 2005				0.002							0.002	
		Sum of 2006				0.001							0.001	
		Sum of 2007											0.001	
		Sum of 2008											0.002	
	SOL	Sum of 2003	0.005											
		Sum of 2004				0.002								
		Sum of 2005				0.002								
		Sum of 2006				0.002								
		Sum of 2007												
		Sum of 2008												
PEL_TRAWL	COD	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	PLE	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
POTS	COD	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	PLE	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												

Table D.4. Continued – Fleet specific landings of cod, plaice and sole relative (%) to the total landings of the countries for the regulated and non-regulated gear in the North Sea (2003-2008). Data from SGMOS-09-05. * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear.

%'s greater then 0.01 are in bold, %'s less then 0.001 are not shown

			COUNTRY											
GEAR	SPECIES	Data	BEL	DEN	ENG	FRA	GBJ	GER	IRL	NED*	NIR	SCO	SWE	Grand Total
TR1	COD	Sum of 2003		**0.0159**	**0.0447**	0.0022		**0.0655**		**0.0108**		**0.0573**	**0.0234**	**0.0289**
		Sum of 2004		**0.0122**	**0.0409**			**0.0637**		0.0097		**0.0445**	0.0093	**0.0243**
		Sum of 2005		**0.0273**	**0.0270**			**0.0815**		0.0057	0.0021	**0.0471**	**0.0137**	**0.0317**
		Sum of 2006		**0.0274**	**0.0320**	0.0037		**0.0840**		0.0061		**0.0548**	0.0066	**0.0353**
		Sum of 2007	0.0015	**0.0325**	**0.0275**	0.0069		**0.0672**		0.0051	0.0017	**0.0498**	0.0098	**0.0328**
		Sum of 2008		**0.0381**	**0.0361**	0.0036		**0.0571**		**0.0108**	0.0034	**0.0536**	**0.0124**	**0.0362**
	PLE	Sum of 2003		**0.0389**	**0.0199**			**0.0130**		0.0039		0.0090	0.0015	**0.0169**
		Sum of 2004		**0.0383**	**0.0239**			0.0072		0.0031		0.0073		**0.0178**
		Sum of 2005		**0.0632**	0.0093			0.0086		0.0045		0.0072	0.0018	**0.0218**
		Sum of 2006		**0.1082**	**0.0341**			**0.0338**		0.0060		**0.0107**		**0.0355**
		Sum of 2007	**0.0163**	**0.1156**	**0.0236**			**0.0232**		0.0060		0.0084		**0.0299**
		Sum of 2008	**0.0200**	**0.1528**	**0.0498**			**0.0507**		**0.0385**		**0.0162**	**0.0118**	**0.0488**
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
TR2	COD	Sum of 2003		**0.0116**	0.0088	**0.0301**	**0.0583**	0.0072		0.0052		0.0082	**0.1589**	**0.0113**
		Sum of 2004	0.0038	**0.0103**	0.0061	**0.0210**	0.0013	0.0051		0.0037		0.0061	**0.1331**	0.0088
		Sum of 2005	0.0037	**0.0120**	0.0072	**0.0287**	0.0090	0.0047		0.0036	0.0077	0.0064	**0.1229**	0.0096
		Sum of 2006	0.0034	**0.0141**	0.0074	**0.0237**	**0.5596**	0.0025		0.0033	0.0072	0.0060	**0.0850**	0.0098
		Sum of 2007	0.0035	**0.0117**	0.0058	**0.0429**	**0.2944**	0.0019		0.0047	0.0083	0.0052	**0.0822**	0.0099
		Sum of 2008	0.0077	**0.0121**	0.0071	**0.0358**	**0.8505**	0.0019		0.0053	0.0090	0.0043	**0.0773**	0.0095
	PLE	Sum of 2003		**0.0357**	**0.0280**	**0.0345**	**0.0477**	**0.0786**		**0.0219**		0.0032	**0.0563**	**0.0246**
		Sum of 2004	**0.0225**	**0.0287**	**0.0250**	**0.0408**	**0.0120**	**0.0576**		**0.0203**		0.0021	**0.0581**	**0.0215**
		Sum of 2005	**0.0212**	**0.0185**	**0.0278**	**0.0407**	**0.0320**	**0.0538**		**0.0215**	0.0014	0.0022	**0.0461**	**0.0176**
		Sum of 2006	**0.0265**	**0.0224**	**0.0197**	**0.0265**	**0.1317**	**0.0435**		**0.0303**	0.0025	0.0021	**0.0558**	**0.0183**
		Sum of 2007	**0.0138**	**0.0212**	**0.0194**	**0.0284**	**0.1361**	**0.0407**		**0.0320**	0.0041	0.0024	**0.0614**	**0.0166**
		Sum of 2008	**0.0153**	**0.0192**	**0.0405**	**0.0240**	**0.0285**	**0.0303**		**0.0507**	0.0043	0.0046	**0.0713**	**0.0193**
	SOL	Sum of 2003			0.0019	**0.0170**	0.0058	0.0027		0.0022				0.0024
		Sum of 2004	0.0073		0.0014	**0.0168**		0.0015						0.0018
		Sum of 2005	0.0076		0.0019	**0.0145**							0.0027	0.0017
		Sum of 2006	0.0064		0.0024	**0.0159**	0.0073						0.0017	0.0023
		Sum of 2007	0.0055		0.0022	**0.0200**				0.0011			0.0027	0.0025
		Sum of 2008	**0.0139**		0.0040	**0.0164**	0.0027			0.0029				0.0028
TR3	COD	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	PLE	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												
	SOL	Sum of 2003												
		Sum of 2004												
		Sum of 2005												
		Sum of 2006												
		Sum of 2007												
		Sum of 2008												

Table D.5. Trends in effort (kW*Days) and landings (tonnes) of cod, plaice and sole for the regulated beam trawl gear with mesh size equal or bigger than 120 mm (BT1) in the North Sea by country (2003-2008). Data from SGMOS-09-05. . * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear. (Shaded numbers mark downward trend in recent years).

EFFORT - BT1

	YEAR	BEL	DEN	ENG	GER	NED*	SCO
EFFORT	2000	2362246	110770	246330	1502	91720	
	2001	1878508	101605	524065	7947	179837	
	2002	1797995	1179534	2202520	113297	484240	971920
	2003	1036595	1498917	1060810	47736	581685	866666
	2004	1262243	1366044	671129	31698	708628	694716
	2005	1391340	1316858	618160	2128	744275	730810
	2006	1234613	788892	1321240	53986	1546520	603091
	2007	1247506	856617	305837	30297	733878	349914
	2008	948817	449199	228530	17674	370417	68568

LANDINGS - BT1

	YEAR	BEL	DEN	ENG	GER	NED*	SCO
COD	2003	492	98	29	3	33	38
	2004	953	140	24	2	104	52
	2005	901	159	16	0	324	35
	2006	815	90	39	6	176	39
	2007	586	57	10	3	89	31
	2008	295	36	2	4	38	0
PLE	2003	1016	2837	1316	35	534	950
	2004	1310	2681	910	34	636	600
	2005	1057	2616	816	2	854	584
	2006	1518	2783	1966	297	2051	1097
	2007	2051	1830	675	117	984	568
	2008	1280	904	603	56	603	169
SOL	2003	15	16	8	10	9	12
	2004	19	24	3	0	8	5
	2005	7	17	4	0	6	5
	2006	16	16	7	3	12	8
	2007	7	16	1	0	5	6
	2008	10	11	2	1	12	0

Table D.6. Trends in effort (kW*Days) and landings (tonnes) of cod, plaice and sole for the regulated beam trawl gear with mesh size equal or bigger than 70 mm and less then 120 mm (BT2) in the North Sea by country (2003-2008). Data from SGMOS-09-05. . * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear (Shaded numbers mark downward trend in recent years).

EFFORT - BT2

	YEAR	BEL	DEN	ENG	GER	NED*	SCO
EFFORT	2000	6768007	1992238	8145405	2459026	59427950	5345438
	2001	6879374	1913399	7738242	2133383	56053016	6049219
	2002	6875041	583988	3876855	1873683	51893123	4584209
	2003	6824266	116717	3572791	1669870	47910055	3766255
	2004	6127977	87890	4230884	2080593	44894068	4610314
	2005	5486958	100871	4470070	2212397	44569073	4185264
	2006	5720243	92798	3333673	1927398	39078154	3109683
	2007	5395452	104694	3576089	1590823	38121641	2800641
	2008	5812071	39730	2332746	1464163	27648790	1354776

LANDINGS - BT2

	YEAR	BEL	DEN	ENG	GER	NED*	SCO
COD	2003	709	11	97	65	1367	169
	2004	429	5	83	51	928	123
	2005	446	11	114	53	915	89
	2006	431	4	96	48	958	86
	2007	343	4	85	22	932	54
	2008	561	8	63	27	1059	39
PLE	2003	4035	247	3823	1325	26782	4465
	2004	3532	118	4997	1798	23303	5835
	2005	2750	220	4690	1634	21235	4639
	2006	2618	386	3262	1153	20578	3475
	2007	2765	460	4374	812	20624	3468
	2008	3035	146	3733	815	16968	2434
SOL	2003	3081	4	934	583	12384	238
	2004	2780	1	975	815	12736	351
	2005	2457	2	609	612	10839	361
	2006	2415	0	499	362	8162	332
	2007	2365	3	574	341	10128	511
	2008	2518	1	443	322	9098	231

Table D.7. Trends in effort (kW*Days) and landings (tonnes) of cod, plaice and sole for the regulated gill net gear (GN1) in the North Sea by country (2003-2008). Data from SGMOS-09-05. . * Data from the Netherlands were provided during the WG as the data from SGMOS-09-05 was not split up by regulated and non regulated gear. (Shaded numbers mark downward trends in recent years).

EFFORT - GN1

	YEAR	BEL	DEN	ENG	GER	NED*	SCO
EFFORT	2000	61831	4705094	753234	201693	191569	32240
	2001	102091	4440151	732539	125444	177290	63254
	2002	93282	3809195	556773	127983	231998	47377
	2003	128220	2556357	342138	191424	460895	196852
	2004	106717	2503663	362507	163665	416025	197407
	2005	108149	2355996	308493	273203	387945	165644
	2006	99327	2086501	311045	236585	512022	293823
	2007	69973	1234706	182202	152633	521697	320785
	2008	94133	1328785	75938	281182	507733	417076

LANDINGS - GN1

	YEAR	BEL	DEN	ENG	GER	NED*	SCO
COD	2003	94	2588	314	126	114	13
	2004	35	3257	351	273	101	13
	2005	23	3138	206	270	57	6
	2006	25	2667	223	159	92	4
	2007	21	1917	117	159	50	2
	2008	30	1973	237	155	70	3
PLE	2003	7	4393	1	22	1	0
	2004	4	2872	1	15	4	0
	2005	4	2652	1	13	1	0
	2006	5	2878	0	15	2	0
	2007	4	1447	1	13	1	0
	2008	4	1695	1	9	1	0
SOL	2003	34	538	2	74	0	0
	2004	49	489	1	90	86	0
	2005	52	571	1	120	84	0
	2006	44	532	1	96	125	0
	2007	22	345	5	73	166	0
	2008	51	429	5	145	200	0

Table D.8. Historic trends in days at sea by vessel specified in the Council Regulation from 2003 to 2008. (From Report of the SGRST-08-03 Working Group of Fishing Effort Regime).

Annex	AREA	REG GEAR	SPECON	2003	2004	2005	2006	2007	2008
IIA	2a	4ai	none	276	240	228	228	228	228
IIA	2a	4aii	IIA83b			252	365	365	365
IIA	2a	4aii	IIA83d		365	365	280	280	280
IIA	2a	4aii	none	300	264				
IIA	2a	4aiii	IIA83a			144	137	126	126
IIA	2a	4aiii	IIA83d		365	365	365	365	365
IIA	2a	4aiii	none	300	264	108	103	95	71
IIA	2a	4aiii deleted (2007)	IIA83b				365		
IIA	2a	4aiii new (2007)	IIA83l					132	132
IIA	2a	4aiv	IIA83a			144	137	137	137
IIA	2a	4aiv	IIA83c		168	156	148	148	148
IIA	2a	4aiv	IIA83d		365	365	365	365	353
IIA	2a	4aiv	none	108	120	108	103	103	103
IIA	2a	4av	IIA83a			144	137	137	137
IIA	2a	4av	IIA83c		180	168	160	160	160
IIA	2a	4av	IIA83d		365	365	365	365	365
IIA	2a	4av	IIA83h			120	115	115	115
IIA	2a	4av	IIA83j			144	149	149	103
IIA	2a	4av	none	108	120	108	103	103	103
IIA	2a	4ci	none	192	168	156	140	140	140
IIA	2a	4cii new (2007)	none	192	168	156	140	140	140
IIA	2a	4ciii new (2007) former 4cii	none	192	168	156	140	140	140
IIA	2a	4civ new (2007) former 4ciii	IIA83f		192	180	162	162	162
IIA	2a	4civ new (2007) former 4ciii	none	192	168	156	140	140	140
IIA	2a	4d	IIA83g				140	140	140
IIA	2a	4d	none	192	168	156	140	140	140
IIA	2a	4e	none	228	204	192	173	173	173
IIA	2b	4ai	none	276	240	228	228	228	228
IIA	2b	4aii	IIA83b				365	365	365
IIA	2b	4aii	IIA83d		365	365	280	280	280
IIA	2b	4aiv	IIA83c		168	156	148	148	148
IIA	2b	4aiv	IIA83d		365	365	365	365	365
IIA	2b	4aiv	none	108	120	108	103	95	86
IIA	2b	4av	IIA83c		180	168	160	160	160
IIA	2b	4av	IIA83d		365	365	365	365	365
IIA	2b	4av	IIA83h			120	115	115	115
IIA	2b	4av	none	108	120	108	103	96	86
IIA	2b	4ci	none		168	156	140	140	140
IIA	2b	4cii new (2007)	none		168	156	140	140	126
IIA	2b	4ciii new (2007) former 4cii	none		168	156	140	130	117
IIA	2b	4civ new (2007) former 4ciii	none		168	156	140	140	140
IIA	2b	4d	none		168	156	140	140	140
IIA	2b	4e	none		204	192	173	173	173
IIA	2b1	4aii	IIA83b			252	365	365	365
IIA	2b1	4aii	none	300	264				
IIA	2b1	4aiii	IIA83a			144	137	126	126
IIA	2b1	4aiii	IIA83d		365	365	365	365	365
IIA	2b1	4aiii	none	300	264	108	103	95	86
IIA	2b1	4aiii new (2007)	IIA83l					132	132

Table D.8. (Continued)

IIA	2b1	4aiv	IIA83a			144	137	137	137
IIA	2b1	4av	IIA83a			144	137	137	137
IIA	2b1	4av	IIA83j			144	149	149	149
IIA	2b1	4ciii	IIA83f				140	140	140
IIA	2b12	4bi	none	180	168	156	143	132	119
IIA	2b12	4bii	none	180	168	156	143	143	143
IIA	2b12	4biii	IIA83c			156	155	155	155
IIA	2b12	4biii	IIA83i				155	155	155
IIA	2b12	4biii	none	180	168	156	143	143	129
IIA	2b12	4biv	IIA83c			168	155	155	155
IIA	2b12	4biv	IIA83e				155	155	155
IIA	2b12	4biv	IIA83i				155	155	155
IIA	2b12	4biv	none	180	168	156	143	143	129
IIA	2b12	4d	IIA83g				140	140	140
IIA	2b12	4d	none	192	168	156	140	140	140
IIA	2b12	4e	none	228	204	192	173	173	173
IIA	2b2	4aii new (2007)	none	300	264	252	227	204	184
IIA	2b2	4aii new (2007)	IIA83c					215	215
IIA	2b2	4aiv	IIA83a			144	103	103	103
IIA	2b2	4av	IIA83a			144	103	103	103
IIA	2b2	4ciii	IIA83f		192	180	162	162	162
IIA	2b23	4aii deleted (2007)	none		264	252	227		
IIA	2b23	4aiii	IIA83a				227	227	227
IIA	2b23	4aiii	IIA83d		365	365	280	280	280
IIA	2b23	4aiii	none		264	252	227	209	188
IIA	2b23	4aiii new (2007)	IIA83l					238	238
IIA	2b23	4aiv	IIA83a				103	103	103
IIA	2b23	4av	IIA83a				103	103	103
IIA	2b23	4av	IIA83j				115	115	115
IIA	2b23	4av new (2007)	IIA83jh					127	127
IIA	2b3	4aii new (2007)	none		264	252	227	221	199
IIA	2b3	4aii new (2007)	IIA83c					227	227
IIA	2b3	4av	IIA83a				103	103	103
IIA	2b3	4bi	none	180	168	156	365	365	365
IIA	2b3	4bii	none	180	168	156	365	365	365
IIA	2b3	4biii	IIA83c			156	365	365	365
IIA	2b3	4biii	IIA83i				365	365	365
IIA	2b3	4biii	none	180	168	156	365	365	365
IIA	2b3	4biv	IIA83c			168	365	365	365
IIA	2b3	4biv	IIA83e				365	365	365
IIA	2b3	4biv	IIA83i				365	365	365
IIA	2b3	4biv	none	180	168	156	365	365	365
IIA	2b3	4ciii	IIA83f				140	140	140
IIA	2b3	4d	IIA83g		240	228	205	205	185
IIA	2c	4ai	none		240	228	228	228	228
IIA	2c	4aii	IIA83b				365	365	365
IIA	2c	4aii	IIA83d		365	365	280	280	280
IIA	2c	4aii	none		264	252	227	204	184
IIA	2c	4aii new (2007)	IIA83c					204	204
IIA	2c	4aiii	IIA83a				227	227	227
IIA	2c	4aiii	IIA83d		365	365	280	280	280
IIA	2c	4aiii	none		264	252	227	227	227
IIA	2c	4aiii deleted (2007)	IIA83b				365		
IIA	2c	4aiii new (2007)	IIA83l					238	238
IIA	2c	4aiv	IIA83a				114	114	114
IIA	2c	4aiv	IIA83c		168	156	148	148	148
IIA	2c	4aiv	IIA83d		365	365	365	276	276
IIA	2c	4aiv	IIA83k				166	166	166
IIA	2c	4aiv	none		120	120	114	105	86

Table D.8. (Continued)

IIA	2c	4av	IIA83a				114	114	114
IIA	2c	4av	IIA83c		180	168	160	160	160
IIA	2c	4av	IIA83d		365	365	365	365	365
IIA	2c	4av	IIA83h			120	126	126	126
IIA	2c	4av	IIA83j				126	126	126
IIA	2c	4av	IIA83k				178	178	178
IIA	2c	4av	none		120	120	114	114	114
IIA	2c	4av new (2007)	IIA83jh					138	138
IIA	2c	4bi	none		168	156	143	132	132
IIA	2c	4bii	none		168	156	143	143	143
IIA	2c	4biii	IIA83c			156	155	155	155
IIA	2c	4biii	IIA83i				155	155	155
IIA	2c	4biii	none		168	156	143	143	143
IIA	2c	4biv	IIA83c			168	155	155	155
IIA	2c	4biv	IIA83e				155	155	155
IIA	2c	4biv	IIA83i				155	155	155
IIA	2c	4biv	none		168	156	143	143	143
IIA	2c	4ci	none		168	156	140	140	140
IIA	2c	4cii new (2007)	none		168	156	140	140	140
IIA	2c	4ciii new (2007) former 4cii	none		168	156	140	140	115
IIA	2c	4civ new (2007) former 4ciii	IIA83f				140	140	140
IIA	2c	4civ new (2007) former 4ciii	none		168	156	140	140	140
IIA	2c	4d	IIA83g				140	140	140
IIA	2c	4d	none		168	156	140	140	140
IIA	2c	4e	none		204	192	173	173	173
IIA	2d	4ai	none	276	240	228	228	228	228
IIA	2d	4aii	IIA83b				365	365	365
IIA	2d	4aii	IIA83d		365	365	280	252	252
IIA	2d	4aii	none	300	264	252	227	227	204
IIA	2d	4aii new (2007)	IIA83c					227	227
IIA	2d	4aiii	IIA83a				227	227	227
IIA	2d	4aiii	IIA83d		365	365	280	280	280
IIA	2d	4aiii	none	300	264	252	227	227	227
IIA	2d	4aiii deleted (2007)	IIA83b				365		
IIA	2d	4aiii new (2007)	IIA83l					238	238
IIA	2d	4aiv	IIA83a				91	91	91
IIA	2d	4aiv	IIA83c		168	156	148	148	148
IIA	2d	4aiv	IIA83d		365	365	365	276	276
IIA	2d	4aiv	none	108	120	96	91	84	69
IIA	2d	4av	IIA83a				91	91	91
IIA	2d	4av	IIA83c		180	168	160	160	160
IIA	2d	4av	IIA83d		365	365	365	279	279
IIA	2d	4av	IIA83h			120	103	103	103
IIA	2d	4av	IIA83j				103	103	103
IIA	2d	4av	none	108	120	96	91	85	70
IIA	2d	4av new (2007)	IIA83jh					115	115
IIA	2d	4bi	none	180	168	156	143	143	143
IIA	2d	4bii	none	180	168	156	143	143	143
IIA	2d	4biii	IIA83c			156	155	155	155
IIA	2d	4biii	IIA83i				155	155	155
IIA	2d	4biii	none	180	168	156	143	143	143
IIA	2d	4biv	IIA83c			168	155	155	155
IIA	2d	4biv	IIA83e				155	155	155
IIA	2d	4biv	IIA83i				155	155	155
IIA	2d	4biv	none	180	168	156	143	143	143
IIA	2d	4ci	none	192	168	156	140	140	140
IIA	2d	4cii new (2007)	none	192	168	156	140	140	140
IIA	2d	4ciii new (2007) former 4cii	none	192	168	156	140	140	140
IIA	2d	4civ new (2007) former 4ciii	IIA83f				140	140	140
IIA	2d	4civ new (2007) former 4ciii	none	192	168	156	140	140	140
IIA	2d	4d	IIA83g				140	140	140
IIA	2d	4d	none	192	168	156	140	140	140
IIA	2d	4e	none	228	204	192	173	173	173

Table D.8. (Continued)

Regulated Area	Area name or ICES divisions
2a	Kattegat
2b1	Skaggerak
2b2	ICES sub areas II (EC waters) & IV
2b3	ICES division VIId
2b	Regulated areas 2b1, 2b2 & 2b3 combined
2c	ICES division VIIa
2d	ICES division VIa

Table D.8. (Continued)

Derogation			Mesh size range		Special Condition							
					Catch composition track record			Technical gear or other measure				
Gear group Point 4	Special condition Point 8	Gear	mesh size mm From	mesh size To mm	< 5 % cod	> 60 % plaice	< 5 % of cod & < 5% sole & < 5% plaice	escape window : App 1	escape window : App 2	escape window : App 3	GRID: App 2 to Annex III	other
4.a.i		TD	16	31								
4.a.ii		TD	70	89								
4.a.iii		TD	90	99								
4.a.iv		TD	100	119								
4.a.v		TD	120	Inf								
4.a.iii	8.(a)	TD	90	99				120				
4.a.iv	8.(a)	TD	100	119				120				
4.a.v	8.(a)	TD	120	Inf				120				
4.a.ii	8.(b)	TD	70	89							x	
4.a.v	8.(j)	TD	120	Inf					140			
4.a.v	8.(h)	TD	120	Inf								(#) 1
4.a.v	8.(hj)	TD	120	Inf					140			(#) 1
4.a.iii	8.(l)	TD	90	99						95		
4.a.ii	8.(c)	TD	70	89	x							
4.a.iv	8.(c)	TD	100	119	x							
4.a.v	8.(c)	TD	120	Inf	x							
4.a.iv	8.(k)	TD	100	119	x	x						
4.a.v	8.(k)	TD	120	Inf	x	x						
4.a.ii	8.(d)	TD	70	89			x					
4.a.iii	8.(d)	TD	90	99			x					
4.a.iv	8.(d)	TD	100	119			x					
4.a.v	8.(d)	TD	120	Inf			x					
4.b.i		BT	80	89								
4.b.ii		BT	90	99								
4.b.iii		BT	100	119								
4.b.iv		BT	120	Inf								
4.b.iii	8.(c)	BT	100	119	x							
4.b.iv	8.(c)	BT	120	Inf	x							
4.b.iv	8.(e)	BT	120	Inf	x	x						
4.b.iii	8.(l)	BT	100	119	x[4]							
4.b.iv	8.(l)	BT	120	Inf	x[4]							
4.c.i		GE	0	109								
4.c.ii		GE	110	149								
4.c.iii		GE	150	219								
4.c.iv		GE	220	Inf								
4.c.iv[5]	8.(f)	GE	220	Inf	x							(#) 2
4.d		TR	0	Inf								
4.d	8.(g)	TR	0	109								(#) 3
4.e		LL	-	-								

TD = Trawl or Danish seine or 'similar gears' (dredges are included under similar gears)
BT = Beam Trawl
GE = Gill net or entangling net
TR = Trammel net
LL = Long lines
(#) 1: automatic suspension of licences.
(#) 2: >5% turbot & lumpsucker.
(#) 3 absent from port < 24 h.
4. 2008 logbook.
5. Table 1 of Annex IIA refers to 4.c.iii 8.3(f) but only gear with mesh size ≥ 220 mm is eligible for this derogation.

Gear group and special conditions of Annex IIA, Reg. (EC) No. 40/2008.

Table D.9. Relative effort reduction regulations made by the EU Commission for certain North Sea fleets between 2008 and 2009 in kWdays according to the cod and flatfish multi-annual plans. The effort reductions marked in blue is according to the cod multi-annual plan. The yellow marked are the additional ones made exclusively according to the flatfish multi-annual plan. (Made available from the EU Commission Services during SGMOS 02 09).

Kattegat (IIIaS)

		BE	DK	UK	FR	DE	IE	NL	*SP*	SE
TR1	OTB, OTT, PTB, SDN, SSC, SPR ≥ 100 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TR2	100 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 70 mm	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%
TR3	32 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 16 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TB1	TBB ≥ 120 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TB2	120 mm > TBB ≥ 80 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
GN1	all gillnets and entangling nets	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TN1	all trammel nets	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LL1	all longlines	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
None	(non/none/none)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Mer du Nord (IV, IIIaN, VIId)

		BE	DK	UK	FR	DE	IE	NL	*SP*	SE
TR1	OTB, OTT, PTB, SDN, SSC, SPR ≥ 100 mm	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%
TR2	100 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 70 mm	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%
TR3	32 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 16 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TB1	TBB ≥ 120 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TB2	120 mm > TBB ≥ 80 mm	-6.01%	-5.55%	-8.38%	0.00%	-9.78%	0.00%	-9.50%	0.00%	0.00%
GN1	all gillnets and entangling nets	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TN1	all trammel nets	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LL1	all longlines	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
None	(non/none/none)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Mer d'Irlande (VIIa)

		BE	DK	UK	FR	DE	IE	NL	*SP*	SE
TR1	OTB, OTT, PTB, SDN, SSC, SPR ≥ 100 mm	-25%	-25%	-25%	-25%	-25%	-25%	-25%	-25%	-25%
TR2	100 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 70 mm	-25%	-25%	-25%	-25%	-25%	-25%	-25%	-25%	-25%
TR3	32 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 16 mm	0%	0%	0%	0%	0%	0%	0%	0%	0%
TB1	TBB ≥ 120 mm	0%	0%	0%	0%	0%	0%	0%	0%	0%
TB2	120 mm > TBB ≥ 80 mm	0%	0%	0%	0%	0%	0%	0%	0%	0%
GN1	all gillnets and entangling nets	-25%	-25%	-25%	-25%	-25%	-25%	-25%	-25%	-25%
TN1	all trammel nets	0%	0%	0%	0%	0%	0%	0%	0%	0%
LL1	all longlines	0%	0%	0%	0%	0%	0%	0%	0%	0%
None	(non/none/none)	0%	0%	0%	0%	0%	0%	0%	0%	0%

Ouest Ecosse (Via)

		BE	DK	UK	FR	DE	IE	NL	*SP*	SE
TR1	OTB, OTT, PTB, SDN, SSC, SPR ≥ 100 mm	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%
TR2	100 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 70 mm	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%	-25.00%
TR3	32 mm > OTB, OTT, PTB, SDN, SSC, SPR ≥ 16 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TB1	TBB ≥ 120 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TB2	120 mm > TBB ≥ 80 mm	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
GN1	all gillnets and entangling nets	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
TN1	all trammel nets	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
LL1	all longlines	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
None	(non/none/none)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Table D.10 - Partial human consumption *F* rates for sole and Plaice in Regulation area 3b (Council Reg 43/2009) between 2003 and 2008 (F data derived from ICES WGNSSK 2009) (Landings data from SGMOS 09-05 apart from landings data from The Netherlands which was provided during this WG).

Partial Fs North Sea

		2003			2004			2005			2006			2007			2008		
SPECIES	REG_GEAR	Land	F hc	**partial F hc**	Land	F hc	**partial F hc**	Land	F hc	**Partial F hc**	Land	F hc	**Partial F hc**	Land	F hc	**Partial F hc**	Land	F hc	**Partial F hc**
PLE	BEAM	233	0.39	0.00125	75	0.3	0.00033	64	0.21	0.00022	45	0.2	0.00014	38	0.15	0.00010	12	0.13	0.00003
PLE	BT1	7151	0.39	0.03836	6176	0.3	0.02688	5102	0.21	0.01758	7660	0.2	0.02382	5241	0.15	0.01385	3012	0.13	0.00695
PLE	BT2	43133	0.39	0.23141	41589	0.3	0.18101	37790	0.21	0.13019	35892	0.2	0.11162	34830	0.15	0.09202	31631	0.13	0.07296
PLE	DEM_SEINE	5	0.39	0.00003		0.3	0.00000		0.21		6	0.2	0.00002		0.15	0.00000		0.13	0.00000
PLE	DREDGE	5	0.39	0.00003	4	0.3	0.00002	17	0.21	0.00006	7	0.2	0.00002	3	0.15	0.00001	7	0.13	0.00002
PLE	GN1	4500	0.39	0.02414	2958	0.3	0.01287	2734	0.21	0.00942	2917	0.2	0.00907	1523	0.15	0.00402	1731	0.13	0.00399
PLE	GT1	1001	0.39	0.00537	1272	0.3	0.00554	1462	0.21	0.00504	1340	0.2	0.00417	987	0.15	0.00261	663	0.13	0.00153
PLE	LL1	1	0.39	0.00001	11	0.3	0.00005	1	0.21	0.00000	2	0.2	0.00001		0.15			0.13	
PLE	none	70	0.39	0.00038	60	0.3	0.00026	27	0.21	0.00009	23	0.2	0.00007	63	0.15	0.00017	18	0.13	0.00004
PLE	OTTER	365	0.39	0.00196	86	0.3	0.00037	71	0.21	0.00024	43	0.2	0.00013	27	0.15	0.00007	15	0.13	0.00003
PLE	PEL_TRAWL	14	0.39	0.00008	12	0.3	0.00005	10	0.21	0.00003	4	0.2	0.00001	1	0.15	0.00000	8	0.13	0.00002
PLE	POTS		0.39			0.3		1	0.21	0.00000	1	0.2	0.00000	1	0.15	0.00000		0.13	
PLE	TR1	6875	0.39	0.03688	7837	0.3	0.03411	7905	0.21	0.02723	11392	0.2	0.03543	9672	0.15	0.02555	14608	0.13	0.03369
PLE	TR2	9295	0.39	0.04987	8823	0.3	0.03840	5750	0.21	0.01981	4945	0.2	0.01538	4380	0.15	0.01157	4657	0.13	0.01074
PLE	TR3	46	0.39	0.00025	25	0.3	0.00011	21	0.21	0.00007	34	0.2	0.00011	7	0.15	0.00002	1	0.13	0.00000
Total	PLE	72694		0.39000	68928		0.30000	60955		0.21000	64311		0.20000	56773		0.15000	56363		0.13
SOL	BEAM	66	0.57	0.00162	38	0.5	0.00082	22	0.55	0.00060	13	0.41	0.00032	18	0.41	0.00039	17	0.34	0.00033
SOL	BT1	97	0.57	0.00238	68	0.5	0.00147	36	0.55	0.00099	49	0.41	0.00121	30	0.41	0.00065	24	0.34	0.00046
SOL	BT2	18955	0.57	0.46488	19300	0.5	0.41728	16250	0.55	0.44583	12927	0.41	0.32052	15375	0.41	0.33253	13976	0.34	0.26872
SOL	DREDGE	3	0.57	0.00007	3	0.5	0.00006	19	0.55	0.00052	5	0.41	0.00012	4	0.41	0.00009	4	0.34	0.00008
SOL	GN1	898	0.57	0.02202	796	0.5	0.01721	830	0.55	0.02277	708	0.41	0.01755	536	0.41	0.01159	718	0.34	0.01381
SOL	GT1	2124	0.57	0.05209	1951	0.5	0.04218	2169	0.55	0.05951	2011	0.41	0.04986	2162	0.41	0.04676	2055	0.34	0.03951
SOL	none	50	0.57	0.00123	58	0.5	0.00125	1	0.55	0.00003	2	0.41	0.00005	2	0.41	0.00004	11	0.34	0.00021
SOL	OTTER	96	0.57	0.00235	73	0.5	0.00158	60	0.55	0.00165	55	0.41	0.00136	23	0.41	0.00050	19	0.34	0.00037
SOL	PEL_TRAWL	23	0.57	0.00056	15	0.5	0.00032	10	0.55	0.00027	12	0.41	0.00030	2	0.41	0.00004	8	0.34	0.00015
SOL	TR1	29	0.57	0.00071	20	0.5	0.00043	19	0.55	0.00052	30	0.41	0.00074	28	0.41	0.00061	35	0.34	0.00067
SOL	TR2	894	0.57	0.02193	803	0.5	0.01736	628	0.55	0.01723	722	0.41	0.01790	776	0.41	0.01678	809	0.34	0.01556
SOL	TR3	6	0.57	0.00015	1	0.5	0.00002	3	0.55	0.00008	2	0.41	0.00005	1	0.41	0.00002	7	0.34	0.00013
Total	SOL	23241		0.57000	23126		0.50000	20047		0.55000	16536		0.41000	18957		0.41	17683		0.34

ANNEX E: SPATIAL DISTRIBUTION OF FISHING EFFORT FOR NS SOLE AND PLAICE

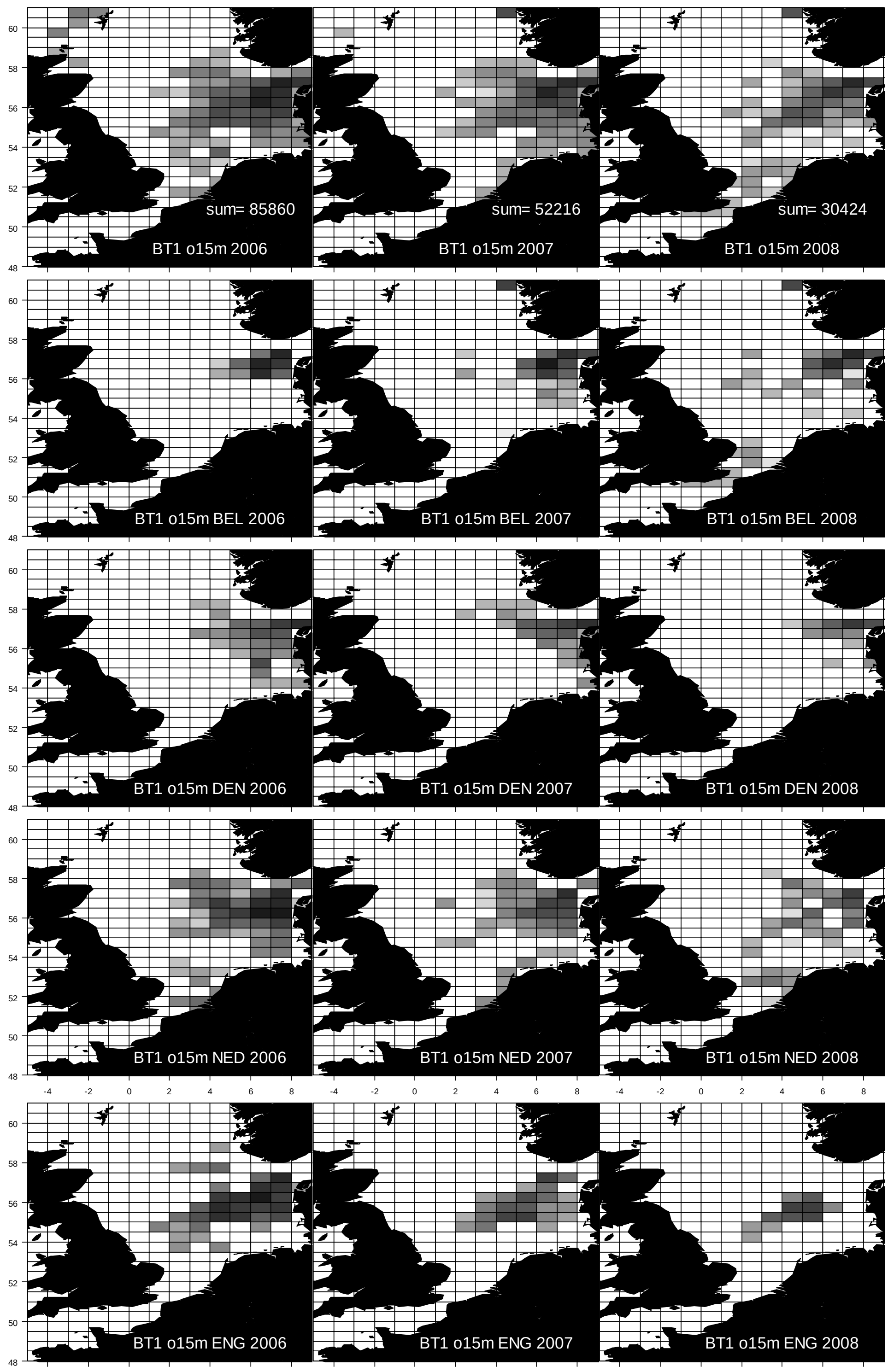

Figure E.1. Spatial distribution of the BT1 fishery by vessels > 15 m. in the North Sea for 2006, 2007 and 2008. Top panels indicate the effort of all countries combined. Other panels indicate the fishing effort for different countries separately for those countries with more than 1 100 days at sea in 2008 in this category.

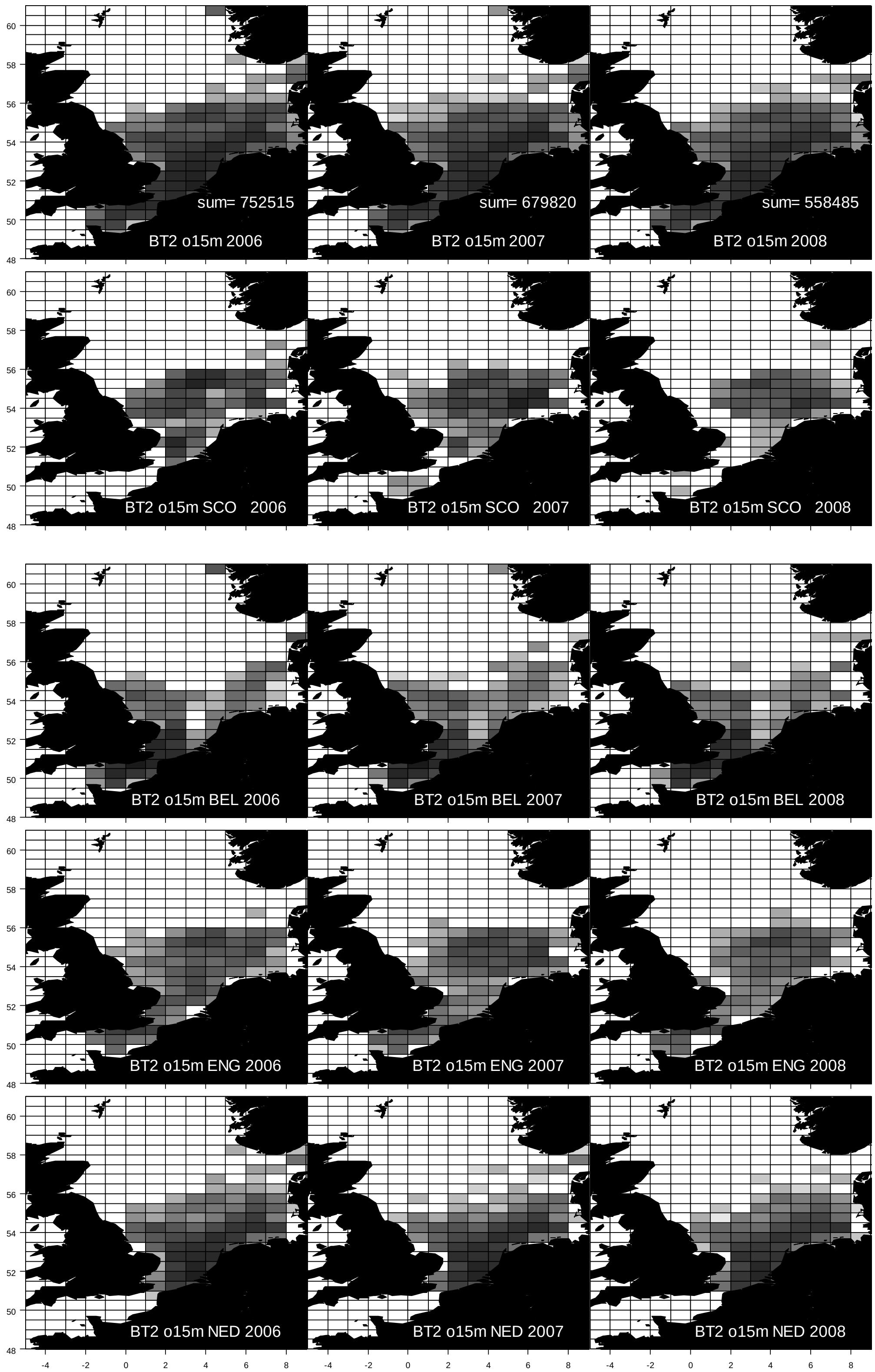

Figure E.2. Spatial distribution of the BT2 fishery by vessels > 15 m. in the North Sea for 2006, 2007 and 2008. Top panels indicate the effort of all countries combined. Other panels indicate the fishing effort for different countries separately for those countries with more than 21 000 days at sea in 2008 in this category

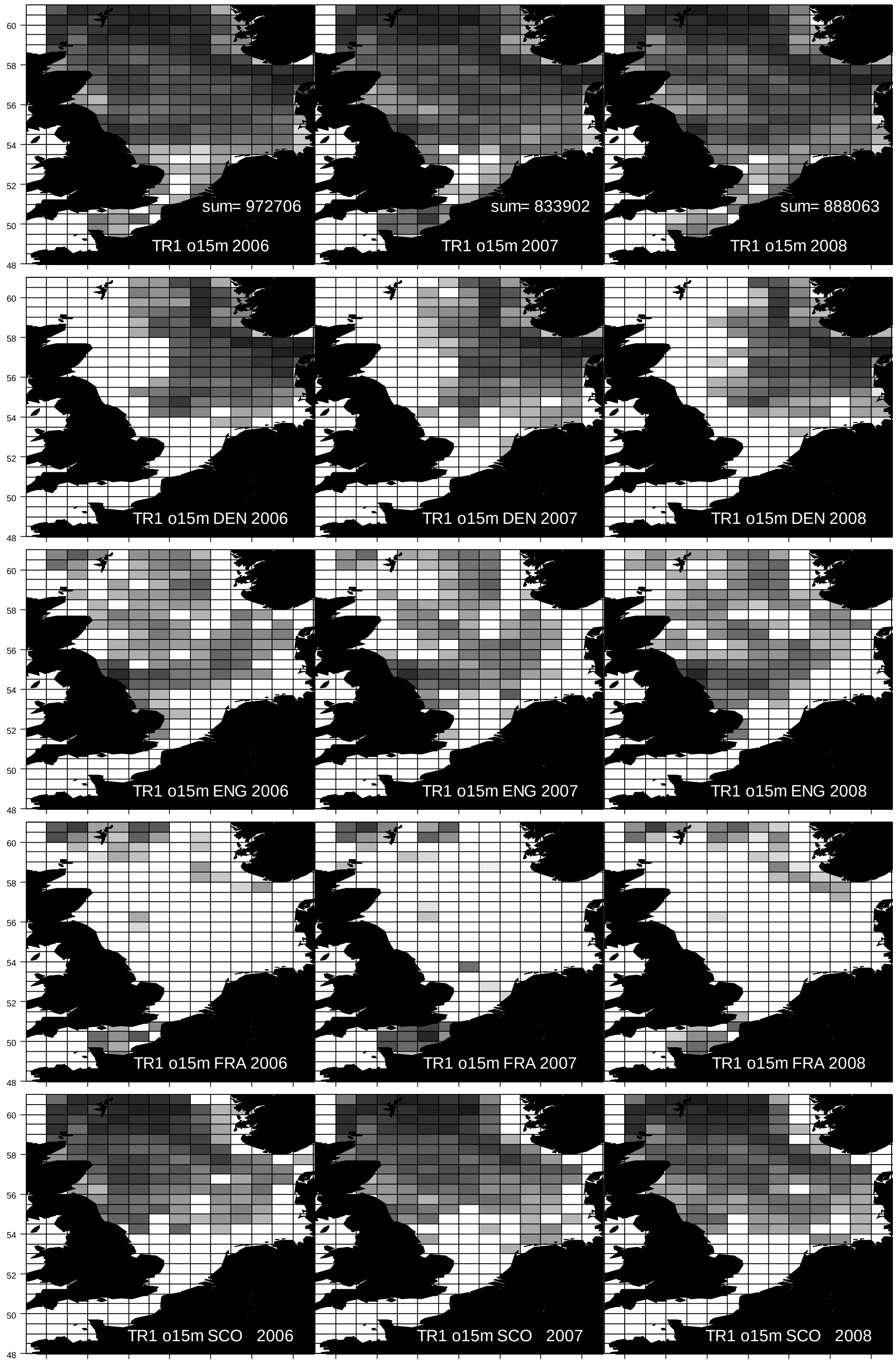

Figure E.3. Spatial distribution of the TR1 fishery by vessels > 15 m. in the North Sea for 2006, 2007 and 2008. Top panels indicate the effort of all countries combined. Other panels indicate the fishing effort for different countries separately for those countries with more than 22 000 days at sea in 2008 in this category.

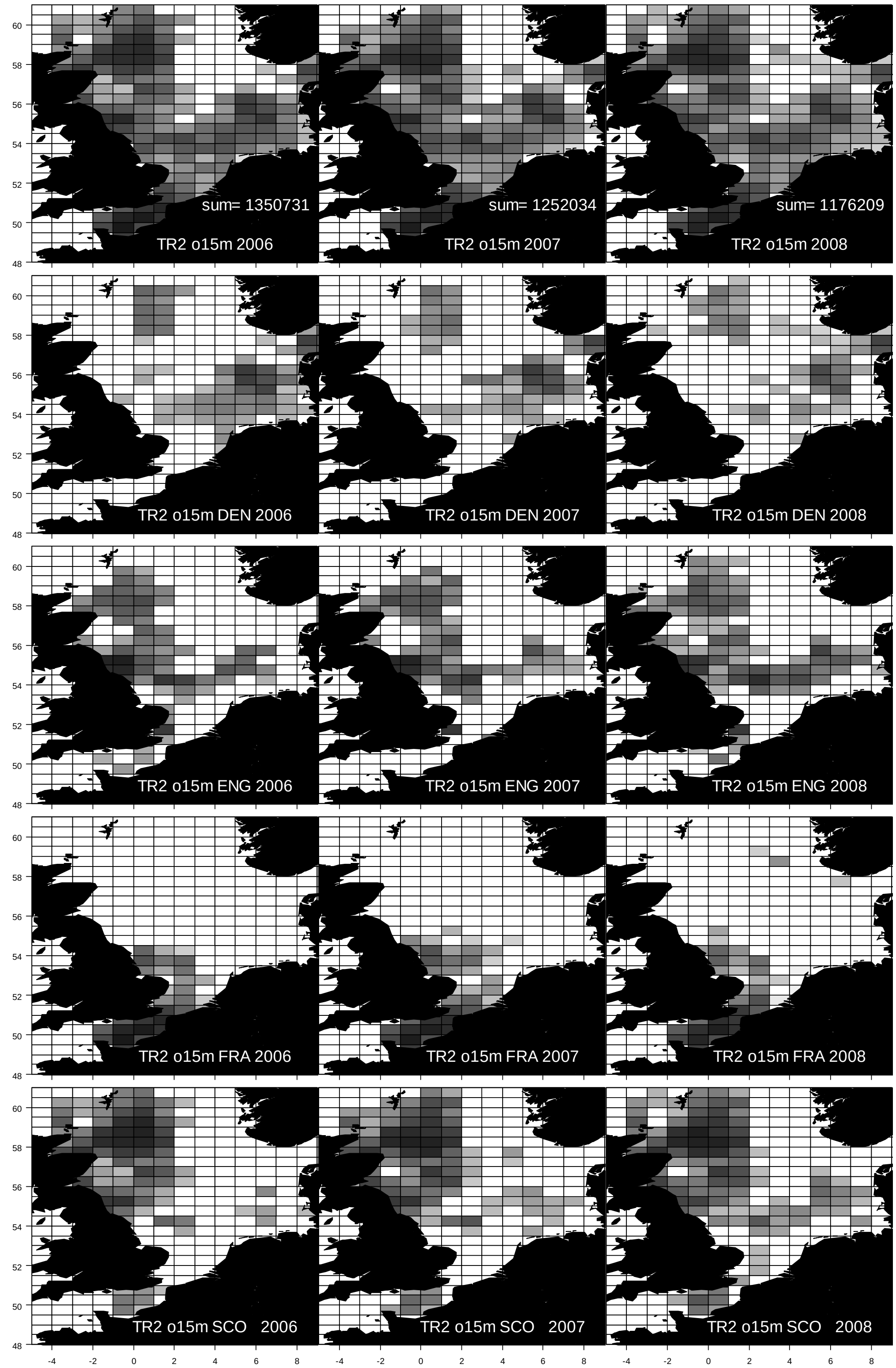

Figure E.4. Spatial distribution of the TR2 fishery by vessels > 15 m. in the North Sea for 2006, 2007 and 2008. Top panels indicate the effort of all countries combined. Other panels indicate the fishing effort for different countries separately for those countries with more than 50 000 days at sea in 2008 in this category.

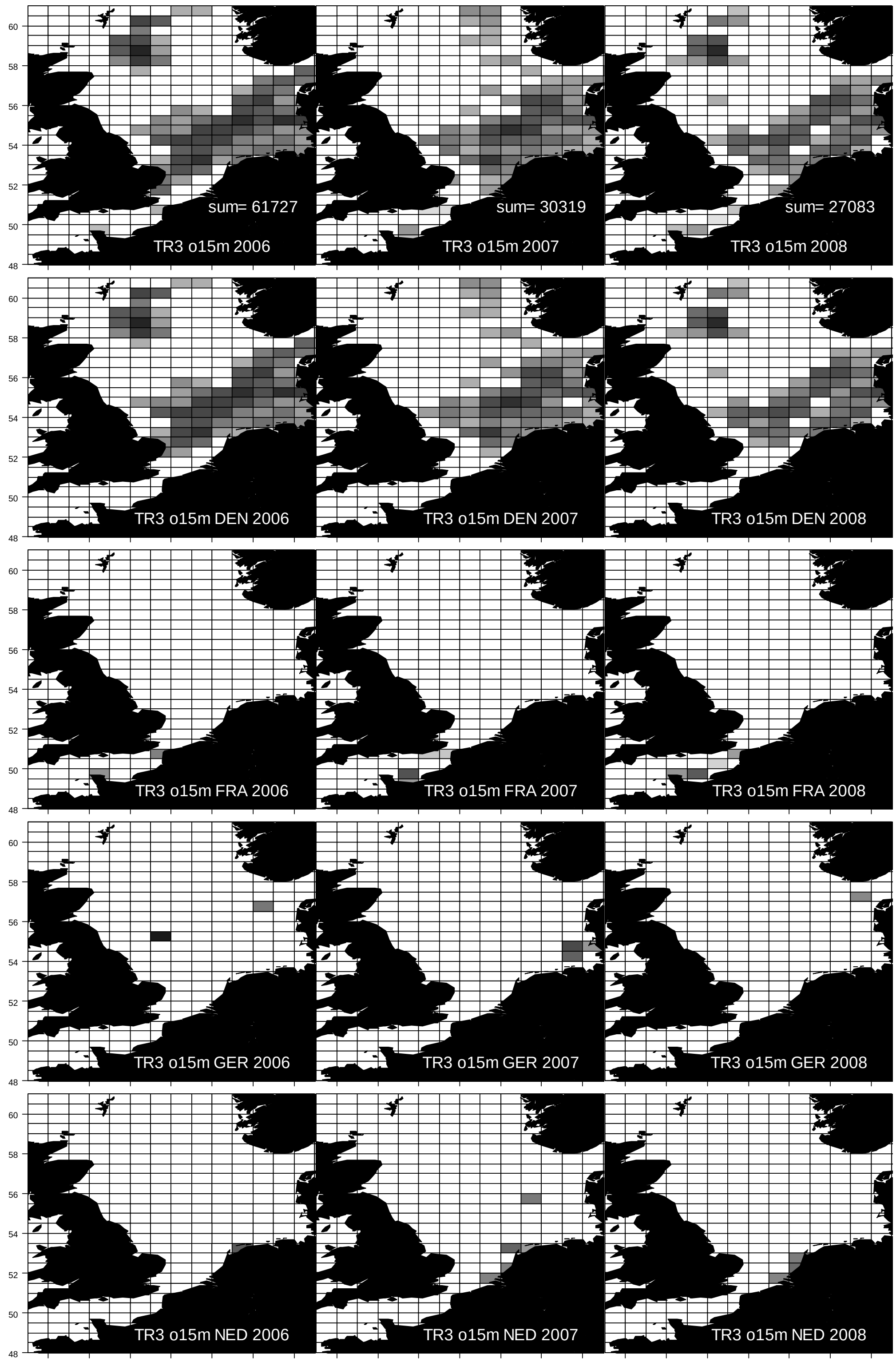

Figure E.5. Spatial distribution of the TR3 fishery by vessels > 15 m. in the North Sea for 2006, 2007 and 2008. Top panels indicate the effort of all countries combined. Other panels indicate the fishing effort for different countries separately for those countries with more than 100 days at sea in 2008 in this category.

ANNEX F: TABLES OF SPATIAL INDIUCATORS FROM SURVEYS OF SOLE IN WESTERN CHANNEL AND NORTH SEA AND PLAICE IN THE NORTH SEA.

Table F.1 : Table of spatial indices for Western Channel sole

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A1	1993	140	140	140	-3.20	50.49	139	0.127	0.712
A1	1994	131	115	104	-3.46	50.44	44	0.227	0.727
A1	1995	349	235	214	-3.36	50.45	114	0.366	0.642
A1	1996	223	133	122	-3.43	50.45	54	0.507	0.721
A1	1997	374	131	133	-3.39	50.45	77	0.687	0.758
A1	1998	388	199	186	-3.35	50.45	130	0.622	0.754
A1	1999	226	202	185	-3.27	50.49	162	0.374	0.736
A1	2000	401	204	231	-3.29	50.49	120	0.494	0.674
A1	2001	251	168	156	-3.31	50.47	114	0.529	0.691
A1	2002	90	80	74	-3.53	50.40	69	0.000	0.842
A1	2003	231	106	117	-3.45	50.48	49	0.252	0.740
A1	2004	120	90	84	-3.39	50.51	68	0.535	0.751
A1	2005	260	68	83	-3.42	50.52	63	0.600	0.772
A1	2006	83	72	67	-3.44	50.49	30	0.000	0.787
A1	2007	212	189	180	-3.16	50.55	121	0.192	0.682
A1	2008	169	98	101	-3.42	50.48	38	0.790	0.737
A2	1993	1743	972	942	-3.23	50.28	494	0.315	0.452
A2	1994	1355	573	621	-3.31	50.37	249	0.547	0.600
A2	1995	1169	822	757	-3.29	50.25	554	0.333	0.541
A2	1996	1386	787	722	-3.23	50.35	305	0.491	0.468
A2	1997	1401	698	709	-3.27	50.34	281	0.394	0.499
A2	1998	2231	1367	1264	-3.27	50.22	490	0.362	0.342
A2	1999	1447	731	705	-3.27	50.36	297	0.482	0.525
A2	2000	1959	1015	994	-3.24	50.31	354	0.407	0.373
A2	2001	2006	1032	979	-3.26	50.31	309	0.470	0.386
A2	2002	933	599	562	-3.38	50.24	399	0.383	0.685
A2	2003	1664	852	827	-3.31	50.31	281	0.570	0.428
A2	2004	877	320	367	-3.34	50.41	171	0.587	0.594
A2	2005	1217	556	606	-3.25	50.42	228	0.529	0.541
A2	2006	1565	867	864	-3.26	50.30	355	0.512	0.548
A2	2007	1790	1096	1028	-3.25	50.26	421	0.450	0.432
A2	2008	1910	1055	1060	-3.35	50.20	424	0.477	0.486
A3	1993	2039	1357	1243	-3.29	50.17	545	0.291	0.363
A3	1994	1706	1060	1017	-3.27	50.29	340	0.426	0.425
A3	1995	1301	863	802	-3.27	50.33	330	0.464	0.508
A3	1996	1490	1005	901	-3.21	50.28	426	0.359	0.372
A3	1997	1748	1061	1015	-3.28	50.26	321	0.432	0.404
A3	1998	2049	1232	1138	-3.21	50.23	399	0.417	0.364
A3	1999	1996	1045	991	-3.23	50.31	374	0.416	0.415
A3	2000	1739	1254	1126	-3.23	50.28	469	0.331	0.381
A3	2001	2186	1209	1127	-3.24	50.31	328	0.416	0.269
A3	2002	1579	1021	1055	-3.32	50.25	331	0.495	0.477
A3	2003	2025	1143	1139	-3.32	50.26	378	0.458	0.351
A3	2004	1016	688	641	-3.23	50.37	235	0.467	0.450
A3	2005	1293	574	698	-3.32	50.30	412	0.468	0.627
A3	2006	1854	1294	1190	-3.26	50.28	406	0.433	0.362
A3	2007	1927	1274	1217	-3.26	50.18	408	0.480	0.392
A3	2008	2070	1137	1096	-3.29	50.22	410	0.476	0.353
A4	1993	2088	1297	1223	-3.35	50.12	557	0.294	0.408
A4	1994	1917	1268	1158	-3.34	50.16	476	0.384	0.456
A4	1995	1901	1274	1180	-3.32	50.10	463	0.365	0.411
A4	1996	1305	805	759	-3.24	50.36	314	0.470	0.436
A4	1997	1511	947	935	-3.34	50.23	332	0.442	0.418
A4	1998	1921	1368	1255	-3.20	50.22	413	0.447	0.355
A4	1999	1742	1110	1063	-3.22	50.23	496	0.386	0.430

Table F.1 cont: Table of spatial indices for Western Channel sole

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A4	2000	1854	1314	1218	-3.19	50.21	424	0.461	0.412
A4	2001	2220	1467	1360	-3.31	50.15	478	0.464	0.364
A4	2002	1367	819	793	-3.25	50.27	378	0.448	0.550
A4	2003	1960	1305	1220	-3.32	50.21	418	0.443	0.415
A4	2004	782	580	524	-3.36	50.05	452	0.324	0.543
A4	2005	1404	881	825	-3.26	50.37	370	0.337	0.421
A4	2006	1282	791	749	-3.19	50.38	309	0.455	0.487
A4	2007	1610	781	865	-3.29	50.21	285	0.463	0.528
A4	2008	1825	1155	1113	-3.32	50.10	411	0.436	0.416
A5	1993	1076	404	532	-3.31	50.30	397	0.284	0.684
A5	1994	1732	1173	1057	-3.30	50.14	453	0.361	0.437
A5	1995	1776	1107	1065	-3.40	50.01	517	0.336	0.396
A5	1996	1293	845	792	-3.18	50.34	368	0.340	0.411
A5	1997	689	525	481	-3.22	50.33	257	0.540	0.646
A5	1998	1273	728	748	-3.24	50.28	270	0.622	0.575
A5	1999	1234	668	630	-3.23	50.32	452	0.418	0.608
A5	2000	1311	989	925	-3.26	50.12	533	0.414	0.559
A5	2001	1713	1227	1144	-3.38	50.12	496	0.360	0.420
A5	2002	553	388	365	-3.26	50.17	321	0.510	0.728
A5	2003	1227	830	778	-3.36	50.13	366	0.543	0.554
A5	2004	582	468	428	-3.16	50.40	354	0.576	0.640
A5	2005	703	542	490	-3.26	50.26	331	0.363	0.661
A5	2006	1369	796	747	-3.19	50.33	313	0.516	0.502
A5	2007	224	168	152	-3.30	50.44	123	0.170	0.691
A5	2008	1543	1032	942	-3.28	50.30	357	0.476	0.381
A6	1993	1112	696	702	-3.29	50.25	475	0.293	0.530
A6	1994	695	604	543	-3.27	50.25	447	0.500	0.694
A6	1995	1613	1231	1127	-3.30	50.14	465	0.386	0.451
A6	1996	964	466	478	-3.13	50.45	245	0.403	0.529
A6	1997	619	368	356	-3.31	50.41	187	0.378	0.603
A6	1998	709	486	439	-3.17	50.37	231	0.431	0.581
A6	1999	777	462	439	-3.13	50.00	462	0.282	0.529
A6	2000	1373	1024	963	-3.39	50.05	564	0.469	0.542
A6	2001	1663	1255	1202	-3.30	50.08	585	0.401	0.431
A6	2002	40	40	40	-3.20	50.60	0	0.000	0.835
A6	2003	490	332	314	-3.14	50.37	183	0.668	0.684
A6	2004	212	190	174	-3.17	50.50	187	0.459	0.712
A6	2005	464	348	319	-3.07	50.37	416	0.303	0.720
A6	2006	425	366	345	-3.31	50.42	301	0.251	0.633
A6	2007	769	436	432	-3.31	50.34	296	0.312	0.614
A6	2008	151	101	101	-3.37	50.35	537	0.207	0.780
A7	1993	916	556	552	-3.46	50.04	431	0.309	0.628
A7	1994	466	381	358	-3.37	50.34	369	0.240	0.670
A7	1995	585	365	388	-3.28	50.20	561	0.281	0.741
A7	1996	1298	949	899	-3.34	50.05	550	0.327	0.506
A7	1997	1222	564	563	-3.45	49.95	607	0.234	0.495
A7	1998	914	679	620	-3.15	50.36	297	0.449	0.544
A7	1999	330	222	204	-3.07	50.52	225	0.324	0.675
A7	2000	444	338	309	-3.29	50.34	289	0.228	0.667
A7	2001	1393	799	804	-3.48	49.91	339	0.336	0.439
A7	2002	85	77	71	-3.53	49.93	435	0.000	0.823
A7	2003	499	335	321	-3.35	50.12	401	0.250	0.713
A7	2004	294	276	261	-3.26	50.25	406	0.384	0.703
A7	2005	487	309	311	-3.33	50.36	244	0.540	0.750
A7	2006	664	545	496	-3.26	50.12	679	0.543	0.632
A7	2007	314	202	226	-3.26	50.49	192	0.526	0.720
A7	2008	1019	679	632	-3.27	50.17	581	0.532	0.599

Table F.2 : Table of spatial indices for NS sole

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A1	1987	6909	1628	1947	6.56	53.77	960	0.410	0.440
A1	1988	9380	2148	2611	6.86	53.68	2685	0.262	0.492
A1	1989	7817	2980	3446	6.17	53.59	5376	0.217	0.650
A1	1990	11790	1757	2043	7.57	54.07	1757	0.281	0.532
A1	1991	6230	1671	2016	4.19	52.61	2116	0.211	0.643
A1	1992	19395	3589	4755	5.45	53.16	7851	0.228	0.570
A1	1993	9160	1466	2117	7.82	54.24	873	0.696	0.479
A1	1994	11319	2884	3161	5.85	53.26	9394	0.191	0.573
A1	1995	16295	2138	3449	5.79	53.18	7075	0.213	0.680
A1	1996	16179	4787	5809	5.46	53.19	7440	0.286	0.568
A1	1997	18262	3480	3983	6.05	53.44	5457	0.242	0.582
A1	1998	13950	4757	4606	5.86	53.33	8750	0.138	0.506
A1	1999	18854	2501	4455	5.24	53.00	8898	0.204	0.683
A1	2000	17600	2863	4248	5.33	53.11	7250	0.197	0.695
A1	2001	17706	3360	5115	5.52	53.27	7669	0.195	0.688
A1	2002	17832	1782	3092	4.67	52.73	4077	0.219	0.729
A1	2003	18345	4827	5437	5.53	53.32	6686	0.286	0.504
A1	2004	13074	2165	3761	5.99	53.33	8796	0.228	0.703
A1	2005	12734	2500	3567	6.78	53.89	6133	0.272	0.641
A1	2006	13103	3839	5042	5.42	53.17	6797	0.243	0.588
A1	2007	17306	3012	4271	6.33	53.54	8008	0.210	0.616
A1	2008	17949	3769	6122	5.05	53.13	5823	0.288	0.638
A2	1987	16187	7189	7216	6.48	54.12	3689	0.353	0.370
A2	1988	14579	4107	5909	6.76	54.05	3824	0.393	0.540
A2	1989	14915	4167	4726	6.81	53.91	3901	0.262	0.434
A2	1990	25301	4086	8059	6.28	53.71	7685	0.326	0.562
A2	1991	24878	5272	7086	6.81	54.04	5539	0.387	0.382
A2	1992	23224	4495	7018	4.82	53.21	6148	0.363	0.544
A2	1993	14448	3098	5090	7.08	54.16	3164	0.431	0.484
A2	1994	19060	3837	6621	6.02	53.56	8020	0.299	0.536
A2	1995	19739	4245	6896	4.78	52.87	7226	0.248	0.484
A2	1996	23415	7896	10462	5.81	53.65	6780	0.393	0.482
A2	1997	21003	8148	8905	5.18	53.44	5632	0.382	0.472
A2	1998	23970	8727	10517	5.56	53.61	6625	0.378	0.444
A2	1999	22938	3716	6829	5.73	53.49	7534	0.317	0.619
A2	2000	19783	4457	7334	5.15	53.25	7254	0.275	0.633
A2	2001	20720	8118	8915	5.12	53.44	5472	0.365	0.468
A2	2002	22246	7068	9074	5.54	53.53	5794	0.325	0.554
A2	2003	20648	4801	7456	4.42	52.88	6064	0.335	0.474
A2	2004	19175	7683	8309	5.41	53.73	4589	0.434	0.387
A2	2005	18581	3386	5809	5.25	53.51	5072	0.437	0.625
A2	2006	15826	4655	6088	4.70	53.00	5973	0.364	0.518
A2	2007	23569	9047	10324	5.32	53.62	6920	0.405	0.422
A2	2008	20380	9125	9702	5.48	53.55	5875	0.304	0.393
A3	1987	17371	8470	8829	6.26	54.26	4023	0.363	0.300
A3	1988	15502	6412	6714	5.24	53.73	5390	0.261	0.395
A3	1989	14871	3544	4569	7.08	54.09	1709	0.537	0.411
A3	1990	25846	7502	11045	6.38	54.05	5660	0.458	0.436
A3	1991	23593	7499	9632	6.58	54.34	3631	0.596	0.370
A3	1992	24444	8449	12277	5.82	53.80	7789	0.382	0.484
A3	1993	8651	3791	4845	5.35	53.87	4161	0.411	0.501
A3	1994	24679	6342	10300	6.31	53.96	5245	0.412	0.462
A3	1995	20585	4959	7347	6.37	53.86	5130	0.406	0.507
A3	1996	23178	11311	11903	5.65	53.84	5722	0.487	0.429
A3	1997	21486	9914	11161	5.19	53.59	5290	0.427	0.438
A3	1998	18031	3245	5110	6.57	53.88	5949	0.326	0.493
A3	1999	22861	6334	8983	5.69	53.71	6668	0.391	0.531
A3	2000	21435	10608	10344	5.64	53.96	4997	0.443	0.368
A3	2001	19576	9476	9828	5.24	53.55	5845	0.319	0.442
A3	2002	22381	11424	10957	5.53	53.69	5969	0.372	0.419

Table F.2 cont.: Table of spatial indices for NS sole

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A3	2003	20414	9493	10133	5.12	53.49	6887	0.410	0.410
A3	2004	19868	10017	10606	4.87	53.43	6178	0.435	0.421
A3	2005	18278	2779	5883	5.25	53.73	3977	0.445	0.597
A3	2006	11426	5659	5999	5.17	53.69	6445	0.454	0.574
A3	2007	21119	7521	8974	5.00	53.39	7270	0.380	0.482
A3	2008	24504	10280	11615	5.19	53.50	5956	0.357	0.382
A4	1987	9563	6176	6018	6.15	54.41	2630	0.451	0.401
A4	1988	12639	6760	6397	5.38	53.91	4935	0.310	0.412
A4	1989	13456	3184	4368	7.14	54.09	2598	0.429	0.409
A4	1990	20419	7583	9661	6.03	53.85	6774	0.399	0.458
A4	1991	26076	7437	9774	6.39	54.27	4289	0.537	0.407
A4	1992	22361	6648	10882	6.32	54.12	6451	0.457	0.522
A4	1993	13984	5737	7112	6.42	54.10	4493	0.400	0.466
A4	1994	3416	2143	2126	4.00	53.44	647	0.660	0.559
A4	1995	22861	9107	10384	5.86	53.86	5546	0.429	0.451
A4	1996	22530	11244	11086	6.11	54.05	5874	0.526	0.377
A4	1997	22219	9844	11603	5.34	53.74	5113	0.461	0.472
A4	1998	14057	6699	7481	6.33	54.05	4627	0.464	0.385
A4	1999	17886	5101	7166	4.97	53.23	7206	0.345	0.571
A4	2000	20098	8997	9197	5.52	53.90	4730	0.443	0.449
A4	2001	21159	11674	11164	5.48	53.76	5646	0.365	0.385
A4	2002	19586	12058	11294	5.45	53.69	6291	0.395	0.396
A4	2003	18677	7437	8665	4.80	53.38	6670	0.396	0.460
A4	2004	17491	6612	8176	5.91	53.84	5563	0.436	0.470
A4	2005	14791	3120	5001	5.00	53.56	4620	0.477	0.631
A4	2006	13221	6674	6772	5.07	53.61	5360	0.498	0.528
A4	2007	13493	4058	4866	4.80	53.40	5856	0.405	0.526
A4	2008	17450	9324	9127	5.16	53.66	5853	0.289	0.405
A5	1987	11515	7291	6944	6.27	54.51	3163	0.465	0.365
A5	1988	2034	1002	956	4.04	53.21	10509	0.131	0.782
A5	1989	7599	3278	3341	7.25	54.33	1206	0.797	0.400
A5	1990	16083	4376	7138	6.51	54.00	5984	0.439	0.508
A5	1991	7538	4685	4791	4.47	53.57	3949	0.351	0.535
A5	1992	23413	12810	13256	5.37	53.81	6791	0.479	0.399
A5	1993	10156	2495	3437	4.64	53.55	1818	0.570	0.536
A5	1994	19383	8929	10184	6.41	54.17	4232	0.521	0.370
A5	1995	14844	9517	9143	5.42	53.76	5362	0.506	0.464
A5	1996	23091	13233	12654	5.51	53.85	6382	0.510	0.399
A5	1997	22065	11125	11782	5.29	53.75	5356	0.473	0.419
A5	1998	7776	2278	3053	7.27	54.31	710	0.795	0.495
A5	1999	21738	4775	7322	4.90	53.18	7240	0.338	0.572
A5	2000	11701	5315	5518	5.10	53.41	6742	0.289	0.558
A5	2001	18908	10736	10237	5.52	53.81	5394	0.377	0.429
A5	2002	13726	8143	7995	5.74	53.84	5498	0.396	0.474
A5	2003	17076	5238	7402	4.59	53.00	6913	0.294	0.448
A5	2004	15550	7066	7898	5.20	53.54	6684	0.360	0.526
A5	2005	9745	4648	5098	5.75	53.80	5535	0.444	0.650
A5	2006	12472	5738	6193	4.72	53.25	6634	0.348	0.557
A5	2007	14244	6470	7350	5.31	54.08	3747	0.485	0.415
A5	2008	7553	5263	4964	5.44	53.75	3012	0.291	0.411
A6	1987	6185	4960	4491	5.84	54.48	1849	0.506	0.426
A6	1988	9116	3864	4156	4.38	53.54	2882	0.381	0.465
A6	1989	5487	3562	3810	6.14	54.05	9049	0.238	0.472
A6	1990	7322	4380	4785	5.75	53.73	7362	0.505	0.571
A6	1991	4814	3848	3601	4.21	53.20	2467	0.290	0.497
A6	1992	5974	3168	3644	7.66	54.45	1137	0.870	0.370
A6	1993	11749	3616	5505	5.26	53.76	3673	0.425	0.572
A6	1994	4588	3570	3383	5.45	54.23	1446	0.769	0.380
A6	1995	12850	6832	7024	6.31	54.18	2740	0.677	0.433
A6	1996	16266	6028	8349	4.93	53.07	7850	0.257	0.521
A6	1997	18378	8116	9017	5.56	53.83	4902	0.476	0.482

A6	**1998**	**7306**	**1735**	**2521**	**7.35**	**54.29**	**638**	**0.768**	**0.533**

Table F.2 cont.: Table of spatial indices for NS sole

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A6	**1999**	**12350**	**1223**	**3456**	**4.84**	**52.89**	**8702**	**0.255**	**0.799**
A6	2000	10029	6158	5762	5.20	53.47	6006	0.295	0.447
A6	2001	11410	5086	5589	4.81	53.75	2437	0.520	0.383
A6	2002	17331	10752	10151	5.73	53.86	6188	0.430	0.395
A6	2003	14149	6895	7881	4.58	53.34	6858	0.432	0.500
A6	2004	6497	2023	2356	6.54	53.94	5455	0.488	0.586
A6	2005	5782	3327	3340	5.67	53.67	6371	0.286	0.688
A6	2006	3552	2962	2700	5.51	54.04	6050	0.522	0.614
A6	2007	15212	4300	6201	4.34	53.16	6022	0.418	0.523
A6	2008	12892	8826	8699	5.09	54.00	2817	0.639	0.280
A7	1987	6492	5188	4668	5.87	54.28	4153	0.330	0.488
A7	1988	5651	4014	3750	4.51	53.81	3453	0.305	0.433
A7	1989	5182	3562	3614	6.84	54.46	4026	0.447	0.489
A7	1990	763	763	763	5.70	54.20	72	0.000	0.577
A7	1991	1525	1091	1173	3.89	52.20	689	0.274	0.678
A7	1992	7278	4992	4936	6.38	54.24	3204	0.529	0.532
A7	1993	620	472	454	4.56	53.38	276	0.000	0.766
A7	1994	15422	10087	9333	6.08	54.24	3752	0.594	0.362
A7	1995	8903	3918	4565	6.12	53.88	5270	0.378	0.586
A7	1996	20521	8681	10575	4.82	53.40	6421	0.438	0.503
A7	1997	12644	6512	7078	5.44	53.69	5079	0.431	0.472
A7	1998	10361	3912	4796	6.87	54.33	1426	0.579	0.453
A7	1999	13782	5022	7416	5.18	53.57	7420	0.302	0.687
A7	2000	11072	5109	5520	5.54	53.92	3536	0.435	0.484
A7	2001	1545	822	957	4.01	52.18	678	0.158	0.720
A7	2002	7036	5820	5291	5.16	53.47	7403	0.311	0.591
A7	2003	16159	5418	6829	4.54	53.06	6700	0.286	0.475
A7	2004	5447	3078	3128	4.69	52.99	7537	0.232	0.604
A7	2005	7840	2780	4412	5.92	53.95	2789	0.540	0.661
A7	2006	5269	2388	2816	4.23	52.83	6234	0.436	0.618
A7	2007	1541	1215	1115	4.17	53.94	383	0.590	0.548
A7	2008	8877	6354	6809	5.72	54.45	3645	0.822	0.515

Table F.3 : Table of spatial indices for NS plaice

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A1	1996	33812	3094	5398	6.78	53.97	5210	0.430	0.677
A1	1997	25521	5986	6502	6.55	53.95	4961	0.304	0.577
A1	1998	34799	6634	7033	6.33	53.94	5234	0.262	0.574
A1	1999	32772	3012	5293	6.51	54.08	4926	0.436	0.769
A1	2000	43799	7586	10304	5.80	53.98	5937	0.406	0.585
A1	2001	34328	4916	7268	6.42	54.22	5526	0.300	0.612
A1	2002	52019	10801	14943	5.77	54.15	6522	0.455	0.492
A1	2003	42546	13155	14328	5.13	53.60	7881	0.385	0.483
A1	2004	43512	7733	12599	5.78	54.03	8183	0.348	0.605
A1	2005	45994	11925	14405	5.28	53.94	8589	0.397	0.518
A1	2006	40137	9607	12928	5.64	54.00	6538	0.411	0.541
A1	2007	54376	12183	15541	5.46	54.30	7278	0.488	0.496
A1	2008	48480	14813	18195	4.71	53.93	8986	0.480	0.510
A2	1996	62949	9976	14600	5.20	54.09	8469	0.530	0.587
A2	1997	70925	5712	10112	6.31	54.18	5938	0.601	0.624
A2	1998	72096	13261	17554	5.82	54.44	8415	0.717	0.465
A2	1999	49827	3740	10568	6.41	54.37	6456	0.576	0.764
A2	2000	76420	18248	22260	4.00	54.15	10580	0.602	0.496
A2	2001	64348	15810	17923	3.71	54.06	10403	0.705	0.446
A2	2002	76366	32767	32723	3.90	54.36	11248	0.860	0.327
A2	2003	70271	19164	23040	4.26	54.38	10054	0.624	0.414
A2	2004	74255	21848	29240	3.46	54.39	12980	0.766	0.475
A2	2005	72877	32332	30861	4.08	54.29	10227	0.639	0.311
A2	2006	75040	6169	15297	2.17	54.08	6820	0.584	0.421
A2	2007	71786	27288	27546	3.47	54.22	8835	0.582	0.298
A2	2008	77210	30874	30595	3.68	54.44	8545	0.663	0.276
A3	1996	83698	17159	30521	4.00	54.75	13959	0.669	0.608
A3	1997	95686	38380	40323	3.23	54.83	17476	0.684	0.355
A3	1998	82891	18831	28604	4.64	54.37	13850	0.802	0.526
A3	1999	76397	13651	21090	5.51	54.66	10180	0.843	0.528
A3	2000	80843	19178	28863	4.92	54.90	10844	0.793	0.476
A3	2001	76290	27644	28757	3.37	54.58	11839	0.704	0.343
A3	2002	80478	39127	41791	2.89	54.93	14735	0.757	0.322
A3	2003	75485	33363	34132	3.65	55.33	13883	0.689	0.290
A3	2004	80394	10978	27930	3.85	54.80	10031	0.718	0.621
A3	2005	79367	25998	34153	2.60	54.85	11483	0.737	0.365
A3	2006	80491	36182	35064	3.87	55.20	12248	0.770	0.246
A3	2007	76812	35938	36254	3.22	54.87	11238	0.905	0.264
A3	2008	80248	39789	38300	3.63	55.15	10233	0.839	0.260
A4	1996	80028	31274	37498	2.16	55.66	18377	0.531	0.444
A4	1997	87585	42732	45850	2.29	55.63	17318	0.669	0.370
A4	1998	77567	27341	36275	3.20	55.12	14038	0.636	0.477
A4	1999	73559	37721	37279	3.19	55.47	17191	0.711	0.357
A4	2000	80401	29796	36469	4.50	55.18	11504	0.828	0.373
A4	2001	75632	34770	35498	3.99	55.32	12662	0.625	0.268
A4	2002	78577	50533	47980	3.11	55.30	13785	0.907	0.265
A4	2003	72568	36043	35655	2.59	55.51	15014	0.616	0.264
A4	2004	77205	12416	28789	2.78	55.33	12738	0.688	0.600
A4	2005	79989	49069	46274	2.95	55.26	12436	0.781	0.240
A4	2006	67622	15515	22792	1.93	54.95	10979	0.767	0.334
A4	2007	76812	36526	34819	3.39	55.58	12032	0.894	0.274
A4	2008	80031	43606	41718	2.96	55.41	12321	0.849	0.248
A5	1996	74171	37478	36927	1.88	56.01	16909	0.488	0.316
A5	1997	72704	30186	30716	0.45	56.21	9842	0.630	0.318
A5	1998	61532	21914	27500	2.04	56.07	13975	0.548	0.376
A5	1999	65355	37078	36063	3.27	55.71	13237	0.766	0.359
A5	2000	72869	30543	32367	2.16	55.59	14320	0.786	0.358
A5	2001	75003	40407	39460	3.95	55.30	12097	0.797	0.257
A5	2002	77170	43372	42395	3.69	55.73	12023	0.926	0.268
A5	2003	70144	32907	33551	2.40	55.81	14364	0.630	0.270

Table F.3 cont : Table of spatial indices for NS plaice

Age	Year	Positive area	Equivalent area	Spreading area	Longitude of the CG	Latitude of the CG	Inertia	Isotropy	Microstructure
A5	2004	71439	24048	33605	2.60	55.69	14424	0.692	0.484
A5	2005	71023	39606	37966	2.95	55.72	12438	0.677	0.250
A5	2006	74633	40566	38525	3.11	55.52	12909	0.813	0.291
A5	2007	69186	36757	35989	3.17	55.54	12197	0.878	0.309
A5	2008	70577	35599	36171	3.49	55.95	10952	0.815	0.216
A6	1996	66229	38013	35475	1.50	56.23	14785	0.475	0.265
A6	1997	66349	36314	35450	1.49	56.35	12568	0.485	0.335
A6	1998	52198	33629	30847	2.81	55.75	12362	0.785	0.319
A6	1999	39367	21898	20751	1.08	56.37	9334	0.693	0.307
A6	2000	62830	24666	26226	1.66	56.04	12311	0.742	0.380
A6	2001	57888	32267	30922	3.16	56.07	13683	0.500	0.294
A6	2002	74337	43407	40573	2.90	55.87	12083	0.851	0.236
A6	2003	65222	37495	35820	3.45	55.86	12975	0.656	0.268
A6	2004	66231	16994	27945	3.27	56.07	12811	0.597	0.543
A6	2005	68229	22201	27855	1.37	55.98	8900	0.569	0.224
A6	2006	59812	35251	34081	2.64	55.70	12140	0.741	0.282
A6	2007	71732	42773	41861	2.99	55.55	11696	0.867	0.286
A6	2008	57012	24736	25178	3.09	55.76	11866	0.571	0.286
A7	1996	50991	27077	25798	1.25	56.49	15001	0.369	0.296
A7	1997	39037	25593	25148	0.97	56.28	10618	0.592	0.432
A7	1998	48933	26998	25604	2.60	56.18	9822	0.669	0.295
A7	1999	34178	15141	18881	2.27	56.22	13164	0.828	0.532
A7	2000	46654	18831	21277	1.53	55.67	12071	0.764	0.442
A7	2001	25938	16813	15178	1.52	56.11	9761	0.476	0.382
A7	2002	53061	25354	24329	1.29	55.88	8061	0.946	0.266
A7	2003	63490	32180	31410	2.48	56.20	13421	0.587	0.271
A7	2004	57475	20908	25677	2.83	55.39	12779	0.706	0.435
A7	2005	65580	35279	34225	2.25	55.80	10802	0.759	0.322
A7	2006	57588	28866	29059	1.74	56.05	11017	0.755	0.318
A7	2007	62337	20480	25829	2.00	55.12	9726	0.883	0.371
A7	2008	67931	31310	31410	2.72	55.81	11463	0.677	0.253

ANNEX G : PROTOCOL FOR OBSERVERS (LAST UPDATE 28 AUGUST 2007)

STECF members and external experts, invited to attend either STECF meetings and working groups, are appointed or invited in their personal capacity. They shall act independently of Member States or stakeholders (Article 13 of Commission Decision 2005/629/EC).

Both STECF members and external experts shall not divulge any information acquired as a result of the work done during the meeting other than divulging the opinions of the STECF (Article 14 of Commission Decision 2005/629/EC). The outcomes of the working group analysis cannot be quoted as STECF opinions (Article 8 of Commission Decision 2005/629/EC). Only the STECF is entitled to deliver an advice (Article 2 of Commission Decision 2005/629/EC).

It is a general policy of the Commission to ensure transparency and participation of stakeholders to the decision making process. Pending the adoption of the STECF Rules of Procedure that will formalize, inter alia, the conditions and procedures to allow the participation of stakeholders as observers to the STECF meetings, the European Commission and the STECF have already started opening on a trial basis some STECF subgroup meetings.

With a view to facilitate the participation of interested stakeholders without negatively affecting the logistics and performance of the forthcoming STECF subgroup meetings the following rules apply:

1. Observers are free to use the information received in the meeting but neither the identity nor the affiliation of the speaker(s), nor that of any other participant, may be revealed (Chatham House Rule).

2. Documents circulated within the meeting, other than those that have been published on the public web-site, may not be distributed outside the meeting.

3. Observers should be aware that the sub-group is a working group of independent scientists that helps prepare the ground for the STECF opinion. In most cases the STECF opinion is not ready until the closest STECF plenary meeting. The observers should not in any way imply that the opinion of the subgroup is that of the STECF itself.

4. Whether or not observers can ask for the floor at the meeting and at which point of the meeting these interventions are allowed is at the discretion of the Chairman of the plenary session or of the working session as appropriate.

5. If there are more requests for attendance than can be accommodated, the meeting organisers will give preference to persons affiliated to the Regional Advisory Councils and the Advisory Committee for Aquaculture and Fisheries.

Those accepting this invitation are deemed to have agreed to comply with these rules. The chairman will reiterate them at the beginning of the meeting. Those not accepting them will be asked to leave.

If a meeting is open for observers this is indicated on the respective meeting web site. Those wishing to participate as observers should register their interest on the STECF website or write to stecf-secretariat@jrc.it Please note that the Commission does not reimburse the travel and subsistence costs of observers.

ANNEX H CONTRIBUTIONS OF STAKEHOLDER OBSERVERS.

H. 1 Contribution of French Sector to SGMOS 0902 Sole of the Bay of Biscay

First of all, this contribution doesn't emerge from the South RAC, given that it wasn't possible to organize a meeting dedicated to this subject right in time (even it is certain that the RAC could have taken on the subject before). RACs have to follow a strict procedure, which implies a validation by their Executive Committee.

This paper puts forwards the French fishermen's opinion on how the sole of Bay of Biscay management plan (EC n°388-2006) has performed.

The CNPMEM[2] (Comité National des Pêches Maritimes et des Elevages Marins) made a consultation of his members and 8 organizations answered (5 producers' organizations – POs – and 3 local and regional fisheries committees – CLPMEM and CRPMEM).

A. <u>Summary of how the sole plan has performed :</u>

1. <u>Perception of the stock:</u>

French fishermen want to get involved in the management of this stock: creation of a working group (GT Sole), 3 meetings in 2008, 1 in 2009, with fishermen and their representatives, POs, Administration and scientists (IFREMER).

Each time, there is a presentation of the stock state and the data used. There can be some misunderstanding because, firstly, fisheries science concepts can be difficult to understand, and secondly, data used for the evaluation come from the previous year and there is difference with what fishermen can see in the fieldwork.

<u>Estimation of the fishing effort:</u> according to IFREMER, the trawlers' effort is stable while the gillnetters' effort is decreasing. But fishermen think that both of them are decreasing, because of the French fleet adjustment plans. Besides, they disagree on the commercial reference fleet used (15 gillnetters + trawlers > 0% sole/sea trip from La Rochelle and Les Sables and which land in LR or Royan since 1997). The reference shall be updated given that half LR and LS trawlers decided a permanent cessation of activity.

They admit that the data quality needs improvement, but so does estimation. They consider the stock is going better, but don't link it necessarily to the sole management plan (the state of the stock depends on the recruitment, which is only predictable...).

[2] National Committee for Marine Fisheries and Sea Farming, which represents all French fishermen

2. *French implementation of the plan:*

The multiannual plan applies on CIEM zones VIII a & b. It concerns especially French and Belgian vessels, but also Dutch and Spanish. The plan is aimed at bringing SSB above the precautionary level of 13 000 tonnes in 2008 and, after that, at ensuring its sustainable exploitation, by reducing the fishing mortality rate on the stock. For the French fisheries, the measures in the plan concern: rules to set the TAC, fishing effort limit through SFP (special fishing permit) and control.

Plan consequences on quotas: POs took restrictive measures so that their sub-quota was open during the whole year. For some of them, the sub-quota was more or less appropriate with their producers these years, but the limitation of inter-annual variability is a security (10% rather than 15%) and must not be deleted. These quotas limitations led in the previous years to an adaptation of the fleet (by decommissioning), especially among trawlers. It is thus possible that the French 2009 quota may not be entirely consumed.

Plan consequences on capacity: sole SFP apply only for vessels that catch and retain on board more than 100 kg of sole in each sea trip. It is restrictive for some boats that have a seasonal activity and need more than 100 kg, even if they don't exceed the limit of 2 tonnes per year. In France, each time a vessel with a sole SFP decommissions, capacity on sole is re-calculated by the Member State (with a reduction corresponding to the capacity of the vessel concerned). It led to a reduction that now prevents new boats to enter in this particular fishery. On a national level, there must be a certain percentage of capacity that could be kept in order to balance catch possibility and fishing possibility.

3. *Difficulties met by the fishing sector:*

- Difficulty to set up new fishermen's own business in the fleet;
  - Boats are getting older and older;
  - Lack of visibility;
  - Difficulty in marketing sole, market was maintained thanks to withdrawal prices in early 2009;
  - Not enough control on all fleet segments;

The three first considerations are directly related to the plan. According to fishermen, it is necessary to evaluate the necessity and the appropriateness of this plan which conducted to reduce capacity (but this is only a French problem).

B. Idea of how the evaluation process should be conducted:

It is necessary to take into account of the timing between the evaluation of the sole management plan and the benchmark workshop (early 2011?).

1. *Governance:*

Fishermen must be included in the process of drawing the future plan. The South RAC must be consulted in early 2010, in exchange of which it will organize meeting(s) to work on a common position (at least, between Belgian and French sector).

Furthermore, co-expertise between scientists and fishermen is required, in order to increase the credibility of the plan (confidence is the first basis).

2. *Indicators:*

Biologic indicators are well-known, unlike socio-economic indicators. Fishermen suggest inclusion of price effects and international marketing context in the evaluation.

They participate in the IFREMER working group ("groupe partenarial bio-économique") dedicated on building suitable and effective socio-economic indicators. It works under 3 objectives:

- take into account the economic dimension: enlarge the vision of MSY to profitability of enterprises by integrating price effect;
- represent indicators of yield (production, fishing intensity) and not only a representation of the production only in function of the fishing effort;
- take into account the economics actors' behaviour.

3. *Future plan objective:*

In the future, capacity must not be lower than catch possibility.

For some fishermen, the precautionary objective is good enough, given that MSY can be seen as a theoretical concept that cannot be implemented for all European stocks. Indeed, they wonder if scientists succeeded in calculating the biomass and fishing mortality level for all of them. In the Bay of Biscay, sole, hake and nephrops stocks are linked, so is it possible to get to the F_{MSY} level for them simultaneously?

Besides, can we consider that reaching the MSY target in 2015 is a long term approach? If MSY is however adopted as a target, it will cut fishing pressure by about 40%, but decommissioning vessels is not the only solution (change in exploitation diagram?). Furthermore, there is a need to adopt a gradual method, step by step, with partial targets, based on the threefold biologic, economic and social objective.

4. *Future plan content:*

- In order to increase their visibility, fishermen want a pluri-annual TAC;
- Technical measures can be taken on a national level (mesh size, net length...), after an evaluation by the STECF.

Lisbon, the 25th November 2009.

H.2 Contribution of NW W RAC to SGMOS 0902 Western Channel sole

South Western Fish Producer Organisation Ltd. 5 Pynewood House, 1a Exeter Road, Ivybridge, Devon, PL21 0FN.

Report by Jim Portus regarding participation for NWWRAC at the meeting of STECF subgroup SGMOS 0902 in Lisbon on 25th November 2009.

Preamble: The NWWRAC has considered on many occasions the introduction of a long-term and multi-annual recovery and management plan for western channel Sole (ICES VIIe). The requirement for such a plan was first mooted in 2003, when scientists at ICES had predicted the SSB of 7e Sole would fall in 2004 below Blim (2,000 tonnes). As a direct result of this alarm a "Recovery Plan" was set in motion, with an interim effort limitation regime initiated for 2005. It has become evident, looking back, that the stock never reached that low level of Biomass. The NWWRAC has submitted opinions to the Commission criticising the terms of the Regulation that were agreed by Council in April 2007. Scientists at CEFAS have confirmed that the achievement of target F0.27 may be as early as end 2009 and this is much faster than was simulated. In the light of ICES abandoning the VIIe sole assessment in early 2009 and against a growing weight of scientific advice that the terms of the Regulation cannot now be implemented, Jim Portus was invited to attend Lisbon to provide evidence to STECF subgroup SGMOS 0902.

Terms of Reference: The main terms of reference for this group are to provide a report to STECF regarding the performance of the management plans on fisheries in the North Sea on plaice and sole, Western channel sole and Bay of Biscay sole. This was the first of such meetings and was used to develop the process of evaluation, both technically and including ways in which RACs / Observers can be involved. Required was some direct input from the RACs on their experiences of these plans over the last 2 / 3 years. Also required was direct input from the RACs on thoughts for the future of such plans. By the end of the day it was hoped to have some initial conclusions on how these specific plans have worked and how the process of evaluating plans in the future should develop.

The evidence provided by Jim Portus for NWWRAC:

- Although STECF has been unable to provide advice to the Commission on this stock in the way required by and envisaged in the management plan Council Regulation (EC) No. 509/2007, the NWWRAC noted that STECF has provided some further guidance to the Commission on the appropriate level of TAC and associated effort limits necessary to achieve the objectives of long-term sustainable exploitation and management.
- The NWWRAC also noted that, according to ICES 2008 advice, F = 0.27 would be reached by end of 2009 at the rate of Fishing Mortality reductions implied by the terms of Council Regulation (EC) No. 509/2007. The NWWRAC believes that too rapid progress has been made towards the achievement of the target fishing mortality in this stock. This pace is much faster than was simulated and there are consequent and unnecessary social and economic disruptions in fishing communities.
- The NWWRAC noted the words of caution in the latest STECF advice note: "...STECF proposes that managers adopt a pragmatic approach to reduce fishing mortality towards the target rate of F = 0.27 through stepwise annual reductions in fishing effort until the target is reached. " "...a more stepwise reduction of fishing days is likely to allow the fleet to adjust to the new regime over time."

- The NWWRAC agrees that the objective of the Western Channel (VIIe) sole management plan should be to rebuild the stock to within safe biological limits and then for the stock to be subject to management measures to maintain that status with a high degree of probability that the stock does not fall to levels where recruitment is impaired and with a sustainable level of fishing mortality. The fact has been noted that the latest scientific survey involving the fishing industry/ science partnership has provided good recruitment indicators.
- The meeting was told that diversion to other areas and diversification to other methods is widespread in order to avoid the reduced quotas. Fuel costs were an important factor at times. Catching the quota then discarding can be more economic than steaming to avoid the quota. Fishers have innovated with selectivity trials, led by CEFAS, to avoid discards and save fuel. Regret was expressed that no account has been taken of 20% fleet decommissioning from the UK beam trawler sector since 2007. Regret was expressed that profitability is not an indicator of success in the Plans. Regret was also expressed that economic incentives are absent. The UK beam trawler sector is committed to achieving MSC Accreditation over next year.
- Disappointment was expressed that the Plan as approved in 2006 by the NWWRAC was not as adopted by Council in April 2007.
- For 7e Sole, scientists noted changes from 2005 onwards to patterns of recorded landings. Enforcement pressure applied to fishers in VIIe has caused re-establishment of fishing patterns that first developed in 70s and 80s, with migration to VIId, VIIfg and VIIa seasonal sole fisheries.
- The meeting heard that the ICES Working Group met earlier this year, but could not find why there is distinct retrospective bias in F (downwards) and B (upwards). The Plan requires TAC to be set in response to F in recent years, yet F is the most unreliable indicator. B is also not a reliable indicator for setting TAC. In 2003 the threat of B falling below Bpa caused the Plan to be initiated, yet in retrospect we now know that B actually was 30% greater than Bpa. In contrast, recruitment R has always been shown retrospectively to have been directly proportional to survey indicators and to have no bias.

Jim Portus, for NWWRAC.
Friday, December 18, 2009.

ANNEX I: DECLARATIONS OF EXPERTS

Declarations of invited experts (experts declarations sgmos 09 02 .pdf) are published on the STECF web site on https://stecf.jrc.ec.europa.eu/home together with the final report.

APPENDIX I: R(EC) NO 388/2006 – MULTI-ANNUAL PLAN FOR SOLE IN THE BAY OF BISCAY

I

(Acts whose publication is obligatory)

COUNCIL REGULATION (EC) No 388/2006

of 23 February 2006

establishing a multiannual plan for the sustainable exploitation of the stock of sole in the Bay of Biscay

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 sole stock in ICES Divisions VIIIa and VIIIb have been subjected to levels of mortality by fishing which have eroded the quantities of mature fish in the sea to the point at which the stocks may not be able to replenish themselves by reproduction and are therefore threatened with collapse.

(2) Measures need also to be taken to establish a multiannual plan for the management of the sole stock in the Bay of Biscay in accordance with Article 5 of 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].

(3) The objective of the plan is to ensure exploitation of Bay of Biscay sole that provides sustainable economic, environmental and social conditions.

(4) Regulation (EC) No 2371/2002 requires, *inter alia*, that to achieve this objective the Community apply the precautionary approach in taking measures to protect and conserve the stock, to provide for its sustainable exploitation and to minimise the impact of fishing on marine ecosystems. The Community should aim for 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 for Bay of Biscay sole and taking into account the interests of consumers.

(5) In order to achieve that objective the fishing mortality rates need to be controlled so that it is highly likely that those rates are reduced from year to year.

(6) Such control of fishing mortality rates can be achieved by establishing an appropriate method for the setting of the level of Total Allowable Catch (TAC) for the stock concerned, and a system under which fishing efforts on this stock are restricted to a level at which the TAC is unlikely to be exceeded.

(7) The Scientific, Technical and Economic Committee for Fisheries has advised that the precautionary biomass for the sole stock in the Bay of Biscay should be 13 000 tonnes.

(8) The Bay of Biscay sole stock is close to precautionary biomass levels, and achieving such levels in the short term does not require the application of a full effort-management system. However, it is opportune to establish measures to limit the total capacity of the main fleets fishing for this stock, with a view to reducing that capacity over time, ensuring that the resource recovers and preventing future effort increases.

(9) 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 [3] need to be included in order to ensure compliance with the measures laid down in this Regulation,

[1] Not yet published in the Official Journal.
[2] OJ L 358, 31.12.2002, p. 59.
[3] OJ L 261, 20.10.1993, p. 1. Regulation as last amended by Regulation (EC) No 768/2005 (OJ L 128, 21.5.2005, p. 1).

HAS ADOPTED THIS REGULATION:

CHAPTER I

SUBJECT MATTER AND OBJECTIVES

Article 1

Subject matter

1. This Regulation establishes a multiannual plan for the sustainable exploitation of the sole stock living in the Bay of Biscay (hereinafter referred to as Bay of Biscay sole).

2. For the purpose of this Regulation 'Bay of Biscay' means the area of the sea delineated by the International Council for the Exploration of the Sea (ICES) as Divisions VIIIa and VIIIb.

Article 2

Objective of the management plan

1. The plan shall aim to bring the spawning stock biomass of Bay of Biscay sole above the precautionary level of 13 000 tonnes in 2008 or before and, thereafter, to ensure its sustainable exploitation.

2. This objective shall be attained by gradually reducing the fishing mortality rate on the stock.

Article 3

Legislative measures and annual TAC setting

1. Once the spawning stock biomass is evaluated by ICES to be equal to or above the precautionary level of 13 000 tonnes, the Council shall decide by qualified majority, on the basis of a Commission proposal, on:

(a) a long-term target fishing mortality rate; and

(b) a rate of reduction in the fishing mortality rate for application until the target fishing mortality rate decided under (a) has been reached.

2. Each year the Council shall decide by qualified majority, on the basis of a proposal from the Commission, on a TAC for the following year for Bay of Biscay sole.

CHAPTER II

TOTAL ALLOWABLE CATCH

Article 4

Procedure for setting the TAC

1. Where the spawning stock biomass of Bay of Biscay sole has been estimated by the Scientific, Technical and Economic Committee for Fisheries (STECF), in the light of the most recent report from ICES, to be below 13 000 tonnes, the Council shall decide on a TAC which, according to the STECF estimation, shall not exceed a level of catches which will result in a 10 % reduction in fishing mortality rate in its year of application compared to the fishing mortality rate estimated for the preceding year.

2. Where the spawning stock biomass of Bay of Biscay sole has been estimated by the STECF, in the light of the most recent report from ICES, to be equal to or above 13 000 tonnes, the Council shall decide on a TAC which shall be set at a level of catches which, according to the STECF estimation, is the higher of:

(a) that TAC whose application conforms with the reduction in fishing mortality rate that has been decided on by the Council in accordance with Article 3(1)(b);

(b) that TAC whose application will result in the target fishing mortality rate that has been decided on by the Council in accordance with Article 3(1)(a).

3. Where application of paragraph 1 or 2 of this Article 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.

4. Where application of paragraph 1 or 2 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 5

Special fishing permit concerning Bay of Biscay sole

1. Member States shall ensure that fishing activities which lead to catches and retention on board of more than 2 000 kg of sole in ICES Divisions VIIIa and VIIIb each calendar year by vessels flying their flag and registered in their territory shall be subject to a Bay of Biscay sole fishing permit. This permit shall be a special fishing permit issued in accordance with Article 7 of Council Regulation (EC) No 1627/94 of 27 June 1994 laying down general provisions concerning special fishing permits ([1]).

([1]) OJ L 171, 6.7.1994, p. 7.

2. Within ICES Divisions VIIIa and VIIIb it shall be prohibited to catch and to retain on board, to tranship or to land any quantity of sole in excess of 100 kg in each sea trip, unless the vessel in question holds a Bay of Biscay sole fishing permit.

3. Each Member State shall calculate the aggregate capacity, in gross tonnes, of its vessels which, in 2002, 2003 or 2004, landed more than 2 000 kg of Bay of Biscay sole. This value shall be communicated to the Commission.

4. Upon written request from the Commission, Member States shall provide, within 30 days, documentation of the catch records made by vessels to which Bay of Biscay sole fishing permits have been granted.

5. Each year Member States shall calculate the aggregate capacity, in gross tonnes, of vessels holding a Bay of Biscay sole fishing permit which, since the entry into force of this Regulation, have been subject to a permanent cessation of fishing activity with State aid under the provisions of Article 7 of Council Regulation (EC) No 2792/1999 of 17 December 1999 laying down the detailed rules and arrangements regarding Community structural assistance in the fisheries sector [1].

6. Each Member State shall only issue Bay of Biscay sole fishing permits to its vessels if the aggregate capacity of those vessels does not exceed the difference between the aggregate capacity determined in accordance with paragraph 3 of this Article and the capacity of vessels subject to permanent cessation of fishing activity determined in accordance with paragraph 5.

7. By way of derogation from paragraph 6, where the Commission has decided, on the basis of scientific reports from the STECF, that the target fishing mortality rate defined in Article 3(1) has been achieved, each Member State shall only issue Bay of Biscay sole fishing permits to its vessels if the aggregate capacity of those vessels does not exceed the aggregate capacity of vessels holding Bay of Biscay sole permits in the previous year.

8. Bay of Biscay sole fishing permits shall be valid for a period of one calendar year and no new fishing permits shall be issued during the fishing year.

9. By way of derogation from paragraph 8 of this Article, new permits may be issued, provided that permits are simultaneously withdrawn from one or more vessels of the same aggregate gross tonnage as that of the vessel or vessels receiving the new permits.

(1) OJ L 337, 30.12.1999, p. 10. Regulation as last amended by Regulation (EC) No 485/2005 (OJ L 81, 30.3.2005, p. 1).

Article 6

Alternative procedure for effort management

1. By way of derogation from Article 5, a Member State whose quota for Bay of Biscay sole is less than 10 % of the TAC may implement a different method of effort management. This method shall establish a reference level of fishing effort equal to the fishing effort deployed in the year 2005. The Member States concerned shall ensure that fishing effort does not exceed the reference level in 2006 and subsequent years.

2. A Member State taking up the derogation in paragraph 1 of this Article may be requested by the Commission to provide a report on the implementation of any different method of effort management. The Commission will communicate this report to all other Member States.

3. For the purposes of paragraph 1, fishing effort shall be measured as the sum, in any calendar year, of the products, calculated for every relevant vessel, of installed engine power measured in kW and the number of days fishing in the area.

4. In 2009 and in each third successive year the Council shall decide, by qualified majority and on the basis of a proposal from the Commission, on revisions to reference levels established under paragraph 1. Such revisions shall aim to ensure an appropriate allocation of fishing opportunities.

5. At the request of a Member State, the maximum annual fishing effort fixed under paragraph 1 may be adjusted by the Commission to allow the Member State to take up fully its fishing possibilities for Bay of Biscay sole. The request shall be accompanied by information on the availability of quotas and on effort. Decisions shall be taken by the Commission within six weeks of the receipt of the request, in accordance with the procedure referred to in Article 30(2) of Regulation (EC) No 2371/2002.

CHAPTER IV

MONITORING, INSPECTION AND SURVEILLANCE

Article 7

Margin of tolerance

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 [2], the permitted margin of tolerance in estimates of the quantities, in kilograms of live weight, of Bay of Biscay sole retained on board vessels, shall be 8 % of the logbook figure. The conversion factor adopted by the Member State whose flag the vessel is flying shall apply.

(2) 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 8

Weighing of landings

The competent authorities of a Member State shall ensure that any quantity of common sole caught in the Bay of Biscay exceeding 300 kg shall be weighed using auction room scales before sale.

Article 9

Prior notification

The master of a Community fishing vessel that has been present in the Bay of Biscay who wishes to tranship any quantity of sole retained on board or to land any quantity of sole in a port or a landing location of a third country shall provide the competent authorities of the flag Member State at least 24 hours prior to transhipping or to landing in a third country, with 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.

Article 10

Separate stowage of common sole

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

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

Article 11

Transport of common sole

1. The competent authorities of a Member State may require that any quantity of common sole exceeding 300 kg caught in any of the geographical areas referred to in Article 1 and first landed in that Member State be weighed before being transported elsewhere from the port of first landing.

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

CHAPTER V

FOLLOW-UP

Article 12

Evaluation of management measures

The Commission shall seek scientific advice from the STECF on the rate of progress towards the targets of the management plan in the third year of application of this Regulation and in each third successive year of application of this Regulation. The Commission shall, where appropriate, propose relevant measures, and the Council shall decide by qualified majority on alternative measures to achieve the target detailed in Article 2.

Article 13

Special circumstances

If the STECF advises that the spawning stock size of Bay of Biscay 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 that is lower than that provided for in Article 4.

CHAPTER VI

FINAL PROVISIONS

Article 14

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 Brussels, 23 February 2006.

For the Council
The President
E. GEHRER

APPENDIX II: R(EC) NO 209/2007 – MULTI-ANNUAL PLAN FOR SOLE IN THE WESTERN CHANNEL

COUNCIL REGULATION (EC) No 509/2007

of 7 May 2007

establishing a multi-annual plan for the sustainable exploitation of the stock of sole in the Western Channel

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 sole stock in ICES Division VIIe has been subjected to levels of fishing mortality which have eroded the quantities of mature fish in the sea to the point at which the stocks may not be able to replenish themselves by reproduction and that the stocks are therefore threatened with collapse.

(2) Measures need to be taken to establish a multi-annual plan for fisheries management of the sole stock in the Western Channel.

(3) The objective of the plan is to ensure exploitation of the Western Channel sole stock that provides sustainable economic, environmental and social conditions.

(4) 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 this objective, the Community shall apply the precautionary approach in taking measures to protect and conserve the stock, to provide for its sustainable exploitation and to minimise the impact of fishing on marine ecosystems. It shall aim at a progressive implementation of an ecosystem-based approach to fisheries management, and shall contribute to efficient fishing activities within an economically viable and competitive fisheries industry, providing a fair standard and taking the interests of consumers into account.

(5) In order to achieve this objective the Western Channel sole stock must be brought within safe biological limits by reducing fishing mortality rates and must be managed in such a way that the full reproductive capacity of the stock is maintained and a high long-term yield is provided for.

(6) The Scientific, Technical and Economic Committee for Fisheries has advised that a fishing mortality rate of 0,27 is consistent with taking a high long-term yield and achieving a low risk of depleting the productive potential of the stock.

(7) 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), and a system whereby fishing efforts on these stocks are restricted to levels at which the TACs are unlikely to be exceeded.

(8) 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 [3], need to be included in order to ensure compliance with the measures laid down in this Regulation.

(9) During the first stage in the years 2007, 2008 and 2009, the multi-annual plan shall be deemed to be a recovery plan and subsequently a management plan within the meaning of Articles 5 and 6 of Regulation (EC) No 2371/2002,

HAS ADOPTED THIS REGULATION:

CHAPTER I

SUBJECT-MATTER AND OBJECTIVES

Article 1

Subject-matter

1. This Regulation establishes a multi-annual plan for the sustainable exploitation of the stock of sole which inhabits the Western Channel (hereinafter referred to as Western Channel sole).

(1) OJ C 33 E, 9.2.2006, p. 495.
(2) OJ L 358, 31.12.2002, p. 59.
(3) 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).

2. For the purpose of this Regulation 'Western Channel' means the area of the sea delineated by the International Council for the Exploration of the Sea as Division VIIe.

Article 2

Objective

1. The multi-annual plan shall ensure the sustainable exploitation of the Western Channel sole stock.

2. This objective shall be attained by achieving and maintaining fishing mortality at a rate of 0,27 on appropriate age-groups.

CHAPTER II

TOTAL ALLOWABLE CATCHES

Article 3

Procedure for setting the Total Allowable Catches

1. For the years 2007, 2008 and 2009 the Council shall decide each year by qualified majority on the basis of a proposal from the Commission on Total Allowable Catches (TACs) for Western Channel sole at that level of catches which, according to a scientific evaluation carried out by the Scientific, Technical and Economic Committee for Fisheries (STECF), is the higher of:

(a) that TAC whose application will result in a 20 % reduction in the fishing mortality rate in 2007 compared to the average fishing mortality rate in the years 2003, 2004 and 2005 as most recently estimated by STECF;

(b) that TAC whose application will result in the fishing mortality rate specified in Article 2(2).

2. For the years 2010, 2011 and 2012 the Council shall decide each year by qualified majority on the basis of a proposal from the Commission on TACs for Western Channel sole at that level of catches which, according to a scientific evaluation carried out by STECF, is the higher of:

(a) that TAC whose application will result in a 15 % reduction in the fishing mortality rate in 2010 compared to the average fishing mortality in the years 2007, 2008 and 2009 as most recently estimated by STECF;

(b) that TAC whose application will result in the fishing mortality rate specified in Article 2(2).

3. For 2013 and subsequent years, the Council shall decide annually by qualified majority on the basis of a proposal from the Commission on TACs for Western Channel sole at that level of catches which, according to a scientific evaluation carried out by STECF, will result in the fishing mortality rate specified in Article 2(2).

4. Notwithstanding paragraph 3, if STECF advises that the fishing mortality rate specified in Article 2(2) has not been achieved by 31 December 2012, paragraph 2 shall apply, *mutatis mutandis*, for 2013, 2014 and 2015 and paragraph 3 shall apply *mutatis mutandis* from 2016.

Article 4

Constraints on variation in TACs

Starting with the first year of application of this Regulation, the following rules shall apply:

(a) where application of Article 3 would result in a TAC which exceeds the TAC of the preceding year by more than 15 %, the Council shall adopt a TAC which shall not be more than 15 % greater than the TAC of that year;

(b) where application of Article 3 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 not more than 15 % less than the TAC of that year.

CHAPTER III

FISHING EFFORT LIMITATION

Article 5

Effort limitation

1. The TACs referred to in Chapter II shall be complemented by a system of fishing effort limitation based on the geographical area and groupings of fishing gear, and the associated conditions for the use of these fishing opportunities specified in Annex IIc to Council Regulation (EC) No 41/2007 of 21 December 2006 fixing for 2007 the fishing opportunities and associated conditions for certain fish stocks and groups of fish stocks, applicable in Community waters and, for Community vessels, in waters where catch limitations are required [1].

[1] OJ L 15, 20.1.2007, p. 1. Regulation as amended by Commission Regulation (EC) No 444/2007 (OJ L 106, 24.4.2007, p. 22).

2. The Council shall decide by a qualified majority, on the basis of a proposal from the Commission, on the maximum number of days at sea available for vessels present in the Western Channel and deploying beam trawls of mesh size equal to or greater than 80 mm and for vessels in the Western Channel deploying static nets with mesh size equal to or less than 220 mm.

3. The maximum number of days at sea referred to in paragraph 2 shall be adjusted in the same proportion as the adjustment in fishing mortality provided for in Article 3.

4. Notwithstanding paragraph 3, the fishing effort level to be established in each of the years 2008 and 2009 shall be maintained at the level established for 2007.

CHAPTER IV

MONITORING, INSPECTION AND SURVEILLANCE

Article 6

Margin of tolerance

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 Western Channel sole retained on board of vessels shall be 8 % of the logbook figure. If no conversion factors are laid down in Community legislation, the conversion factor adopted by the Member State whose flag the vessel is flying shall apply.

Article 7

Prior notification

The master of a Community fishing vessel that has been present in the Western Channel or his representative who wishes to tranship any quantity of sole retained on board or to land any quantity of sole in a port or landing location of a third country shall provide the competent authorities of the flag Member State at least 24 hours prior to transhipping or to landing in a third country, with 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.

(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 8

Separate stowage of common sole

1. It shall be prohibited to retain on board a Community fishing vessel in any individual container any quantity of common 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 common sole retained on board to be cross-checked.

Article 9

Transport of common sole

1. The competent authorities of a Member State may require that any quantity of common sole exceeding 300 kg caught in the Western Channel and first landed in that Member State is weighed in the presence of controllers before being transported elsewhere from the port of first landing.

2. By way of derogation from Article 13 of Regulation (EEC) No 2847/93, quantities bigger than 300 kg of common sole which are transported to a place other than that of landing or import shall be accompanied by a copy of one of the declarations provided for in Article 8(1) of Regulation (EEC) No 2847/93 pertaining to the quantities of the sole transported. The exemption provided for in Article 13(4)(b) of Regulation (EEC) No 2847/93 shall not apply.

Article 10

Specific monitoring programme

By way of derogation from Article 34c(1) of Regulation (EEC) No 2847/93, the specific monitoring programme for the sole stocks concerned may last for more than two years.

CHAPTER V

FINAL PROVISIONS

Article 11

Evaluation of management measures

The Commission shall seek scientific advice from STECF on the rate of progress towards the targets of the management 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 objective specified in Article 2. In particular, the Council may amend the fishing mortality rate specified in Article 2(2) by qualified majority on the basis of a Commission proposal and after consulting the European Parliament.

Article 12

Special circumstances

In the event that STECF advises that the spawning stock size of Western Channel 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 that is lower than that provided for in Articles 3 and 4, and effort control measures other than those provided for in Article 5.

Article 13

European Fisheries Fund

In accordance with Article 3(1), the multi-annual plan shall be deemed to be a recovery plan within the meaning of Article 5 of Regulation (EC) No 2371/2002 in the years 2007, 2008 and 2009, and for the purposes of Article 21(a)(i) of Regulation (EC) No 1198/2006 [1]. Subsequently, the multi-annual 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 14

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 Brussels, 7 May 2007.

For the Council

The President

H. SEEHOFER

(1) OJ L 223, 15.8.2006, p. 1.

Appendix III: R(EC) No676/2007 – multi-annual plan for sole and plaice in the North Sea

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 multiannual 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.

(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;

[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).

(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

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

APPENDIX IV: LIST OF INFORMATION TO REQUESTED FROM THE COMMISSION FOR EVALUATIONS

1. **Provision of Background Information**

   An introductory text to be prepared by the Commission which will

   a. Outlining the historical background to the plan and its design process. For example who proposed the plan and initiated the process; who was consulted during the development of the plan; how the objectives of the plan were developed etc.

   b. The overall objectives of the plan

   c. The text of the plan, including any management reference points that are applicable and any changes that have occurred to text or reference points during the period. Indicate if any considerations additional to the plan were taken, particularly if the plan is multi species. If additional indicators were used during the period of implementation provide these.

   d. The period over which the plan is to be evaluated

2. **General / Quantitative information**

   a. A history of annual *F* and or TAC targets set during the period of implementation. If the plan allows for setting TAC by any other criteria than a fixed rule or if exceptions were made at any time during the period indicate what these were and the basis for them. A table of quota consumption (uptake 2006 to 2009) and national TAC allocation, including any quota swaps (2006-2009)

   b. Data on prices per quarter and auction / region (and weekly if available).

   c. Effort data disaggregated by fishery (STECF Effort database)

   d. Provide Information (A summary paragraph) on the level and effectiveness of enforcement and on the extent of compliance achieved in the practical implementation of the plan from appropriate sources (eg. Inspection reports). Indicate if enforcement has improved or deteriorated because of the plan. This requires a bit more information than just the inspection reports which deal only specifically documented compliance issues.

   e. Provide estimates of the cost of enforcement to allow for evaluation of cost benefit analysis.

   f. Indicate any known differences of information between STECF stock report or ICES stock summary sheet and Commission view of actions taken.

   g. The exploitation (F and or TAC) that the Commission would have implemented in the absence of the plan. A set of Commission policy statements starting in the year of the signing of the plans (2006/07/08) including any elements having led to decision during the negotiation where nothing is/was in Policy Statement or where outcomes departed from policy.

   h. Commission view of any added value that the plan has provided (in addition to catches / economic value) that should be considered.

European Commission

EUR 24367 EN **– Joint Research Centre – Institute for the Protection and Security of the Citizen**

Title: Scientific, Technical and Economic Committee for Fisheries. Report of Study Group on the Evaluation of Fishery Multi-annual Plans (SGMOS-09-02)

Author(s): Heleen Bartelings, Gérard Biais, John Casey, Ulrich Damm, Ralf Döring , Sven Kupschus, David Miller, J. Rasmus Nielsen, Jan Jaap Poos, Robert Scott, John Simmonds, Willy Vanhee, Mathieu Woillez,

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Abstract

SG-MOS 09-02 was held in IPIMAR, Lisbon, (Portugal), on 23-27 November 2009. The aim of the workshop was to provide Evaluations of three multiannual fisheries management plans:- R(EC) No 388/2006 – multi-annual plan for sole in the Bay of Biscay; R(EC) No 209/2007 – multi-annual plan for sole in the Western Channel R(EC) No676/2007 – multi-annual plan for sole and plaice in the North Sea. STECF reviewed the report during its plenary meeting on 26-30 April 2010.

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EUROPEAN COMMISSION

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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