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Impact Assessment regarding the Commission's proposal establishing revised measures for the recovery of cod stocks

Lead DG: DG FISH

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Executive summary

The Impact Assessment concerns a draft proposal that would establish revised approach to the recovery of cod stocks.

The scope of the proposal covers the cod fishery in the four areas covered by the current cod recovery regulation – namely in (1)North Sea, Skagerrak and Eastern Channel; (2)Kattegat; (3)West of Scotland; (4)Irish Sea, and also a new area - (5)Celtic Sea.

The proposal concerns improvements to an existing regulation intended to lead to an increase in cod catches from around 30 000t to more than 200 000t in European waters.

Following on a continuous decline in spawning-stock biomass (SSB)¹ of the cod stocks over the years, the International Council for the Exploration of the Sea (ICES) advised that the stocks were in danger of collapse, and recommended that a recovery regime be put in place. As a result, the Cod Recovery Plan was adopted in 2004 as a commitment by the Council of Ministers to set total allowable catches (TACs) and effort limits according to predefined rules in response to the latest scientific advice.

Unfortunately, after four years of application, the regime has not delivered reduction of fishing mortality on the cod stocks in the Kattegat (1), in the Skagerrak, North Sea and Eastern Channel (2), to the West of Scotland (3) and in the Irish Sea (4) to the extent considered necessary for stock rebuilding. A small increase in the abundance of young cod in the North Sea has not yet led to improvements in the size of the spawning stock.

The plan did not deliver because it was not successful in sufficiently reducing fishing activity that catches cod. This was because:

- the original baselines from which the reductions were calculated were too high;
- the rules governing the setting of fishing activity (as permissible days at sea) were not precise enough;
- the scientific forecasts on which the plan was based became unavailable in several instances.

Despite conditions producing poor recruitments in recent years, cod recovery is possible if fishing mortality (F) were to be reduced sufficiently. It is therefore appropriate to modify the cod recovery plan to address the perceived weaknesses. The Regional Advisory Councils (RACs)² and member states agreed with the need to revise the existing cod recovery rules.

After comprehensive stakeholder consultation, the Commission is proposing changes cod recovery plan. along several lines. The plan would simplify the rule for setting the TACs and make it more robust to weak or absent scientific advice. It would replace the existing days-at-sea system with a method for devolving the administration of fishing effort to Member States, within levels to be defined in Community legislation, and focus the effort reductions on vessels catching the most cod.

The scope of the proposal is relatively small as it recommends a revised approach to the existing plan and therefore the likely environmental, social and economic impacts are as similar to those initially foreseen under the current Regulation. This is a proportionate impact assessment, for which no formal

¹ <http://www.intfish.net/glossary/terms/s.htm>

² <http://europa.eu/scadplus/leg/en/cha/c11128.htm>

inter-service steering group was set up, however experts from DG ENV were participating in the Cod Symposium alongside those from DG FISH.

Scientific Committees and Stakeholders have been consulted. The Commission sought the opinion of Member States and the Regional Advisory Councils (RACs) on the basis of a non-paper which explored two approaches to achieving the necessary cod fishing mortality reductions. One approach, based on generalised reductions in fishing effort in many fisheries catching cod, was widely rejected. The alternative, which was to find ways to “decouple” cod fishing from other fisheries and to reduce those activities, was supported in principle and this option was a base of the new proposal.

Details of consultation processes, options and impacts are provided.

1. Procedural issues and consultation of interested parties

1.1 Organisation and timing

This impact assessment concerns a proposal for a Council Regulation reviewing Council Regulation (EC) No 423/2004³ establishing measures for the recovery of cod stocks. Its development is foreseen in Agenda Planning (FISH/2007/009) and in the 2008 Annual Management Plan of the Directorate-General of Fisheries and Maritime Affairs under the specific objective "Conservation and Management of Fish Resources, protection of biodiversity and sensitive marine habitats" (to propose and negotiate measures, including multi-annual management plans, for the conservation and management of Community fish stocks, joint stocks and stocks partly occurring in international waters, with a view to ensuring the exploitation of fish stocks at maximum sustainable yield levels, taking into account broader environmental, economic and social concerns and making the best use of harvested fish resources, especially by avoiding wasteful discard practices).

The reform of the Common Fisheries Policy set the basis in 2002 for changing to long-term plans and away from annual decision-making. Instead of proposing drastic short term cuts in fishing effort the Commission therefore proposed a multi-annual strategy to bring about cod recovery over period of between 5 and 10 years. This cod recovery plan was adopted in 2004. The recovery plan was a commitment by the Council of Ministers that it would set TACs and effort limits according to predefined rules in response to the latest scientific advice.

Unfortunately, after four years of application there is little sign of stock recovery and therefore the Commission has reviewed the current cod recovery measures and is now proposing an alternative approach to the recovery of cod stocks.

Revised cod recovery measures are foreseen to come into effect no later than the 1st of January 2009. They would comprise two elements. A regulation to replace the existing cod recovery plan, which would establish new rules for setting TACs and effort levels, should be subject to a proposal to be presented early in 2008. However, this would be accompanied by a new form of effort management system, i.e. an overhaul of the "Annex II"⁴ measures. This would only be formally proposed as part of the "fishing opportunities" package in autumn 2008, but would be subject to extensive front-loading discussions during 2008.

This is a proportionate impact assessment and no inter-service steering group has been convened. The proposal is intended to improve the efficiency of an existing regulation. The social, economic and environmental impact is therefore similar to that foreseen in the existing regulation.

1.2 Consultation and expertise

1.2.1 Consultation

Advice has been sought from relevant scientific organisations since 2005. The impact assessment is prepared by DG FISH on the basis of scientific advice concerning long-term management and is complemented with economic analysis using available information. Consultation with stakeholders has taken place with the relevant representative bodies.

³ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2004:070:0008:0011:EN:PDF>

⁴ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:019:0001:0203:EN:PDF>

External expertise has been sought from the International Council for the Exploration of the Sea (ICES) concerning long-term management of fisheries resources of interest to the European Community since 2003. This organisation collates the expertise of fisheries scientists mostly working in the national fisheries laboratories of Member States and provides a systematic and standardised advice to the European Community and to Member States.

Stakeholders were consulted by means of oral presentations during the Cod Symposium and written presentation to the NSRAC and NWWRAC. The Advisory Committee on Fisheries and Aquaculture (ACFA) was also consulted.

Following the Council decision of December 2006 to revise the existing cod recovery Regulation, a first non-paper from the Commission services addressing the review of the plan and the management of fisheries which catch cod was presented at the Cod Symposium in March 2007. The subsequent non-paper setting out the main elements of the intended Commission proposal was sent to the RACs in May 2007.

1.2.2 Expertise

- **STECF expert working group (SGRST)**

In addition to the non-papers, the Commission convened a specific scientific body to evaluate the existing cod recovery measures and to assess the effects of the current fishing effort management schemes defined in Annex II of Regulation (EC) No 41/2007. The Scientific, Technical and Economic Committee for Fisheries (STECF) expert working group on Evaluation of the Cod Recovery Plan (SGRST) met for the first time on 13-17th June 2005 at the Joint Research Centre in Ispra, Italy. The Sub-group also held three meetings in 2007, with the last assessment session taking place on 5-9 November 2007.

- **Symposium on Cod Recovery**

The Symposium on Cod Recovery held by the Regional Advisory Councils for the North Sea (NSRAC) and the North-Western Waters (NWWRAC) in Scotland took place on 9-10 March 2007. The symposium was attended by more than 190 scientists, environmentalists, senior national officials, parliamentarians, fishermen and other stakeholders to discuss cod recovery in the North Sea and North Western Atlantic waters. The Commission, represented by officials of DG FISH and DG ENV, presented their ideas.

1.3 Dissemination of scientific advice and the results of consultations with stakeholders

The Commission consulted Member States and RACs on the basis of a non-paper which showed that cod can and should recover if fishing mortality were to be reduced sufficiently.

The non-paper explored two approaches to achieving such reductions:

- Approach 1: based on generalised reductions in fishing effort in many fisheries catching cod. This approach was widely rejected.
- Approach 2: was to find ways to “decouple” cod fishing from other fisheries and to reduce those activities. This approach was supported in principle but few specific measures to achieve that in practice were suggested.

The RACs have stated a preference for a stock-specific approach; however, few specific management measures have been recommended. The main contributions from RACs were: a voluntary system of temporary closures imposed at short notice (so-called “real-time” closures), and a commitment at the level of individual vessels to avoid catching cod (“cod avoidance plans”).

The following main conclusions from the Cod Symposium can be summarised:

- The cod stocks in the Kattegat (1), in the Skagerrak, North Sea and Eastern Channel (2), to the West of Scotland (3) and in the Irish Sea (4) do not show clear signs of increase in SSB. Observed decreases in fishing mortality have been insufficient to ensure quick and safe recovery. Contrary opinions of some fishermen could not be confirmed by data.
- The cod stock can recover despite potential negative ecological conditions (temperature, plankton regime shift). Environmental change is however expected to cause recovery to be to a lower level of biomass than in environmental conditions had remained unchained. Ecological effects were interpreted as a matter of changes over decadal periods rather than short term.
- There is a huge market demand for cod so in principle everyone should be interested to contribute to stock recovery.

The stakeholders outlined the following concerns and ideas:

- The regional aspects in the plan should be strengthened.
- Fleet definitions and days at sea regulations are too complex and not transparent. Further reductions in days at sea would not be welcomed.
- Technical measures to avoid catching cod and respective incentives should be considered.
- The cooperation between fishermen and scientists should be intensified.
- The revised cod recovery plan should consider the mixed fisheries aspects, including the economic consequences.
- There should be better control and enforcement.

However the economic analysis shows that the "no decouple" option would in a long term have a positive economic outcome, the short-term drastic decrease of catches of the whole range of species associated with cod and reductions in fishing opportunities, made the RACs favoured the "de-coupling" option.

The Commission is committed to taking a gradual approach on a case by case basis to achieve a management of all fisheries based on low F rates in line with MSY. We are starting with cod and decoupling it from other species.

Cod avoidance plans (CAPs) would serve as a mechanism to further reduce cod catches and increase the cost/benefit ratio for the industry. This bottom-up management approach would initially be introduced on a voluntary basis as the measures need to be tested first.

The Commission has taken up the substance of these ideas as far as practical in Community legislation.

The scientific advice from STECF⁵ and the advice from the NSRAC⁶ and the NWWRAC⁷ are available on the websites of the respective committees.

⁵ <http://old-stecf.jrc.it/meetings/sgrst/0701/Draft%20Report%20STECF-SGRST-07-01%20EVALUATION%20COD%20RECOVERY%20PLAN%2020070420.doc>

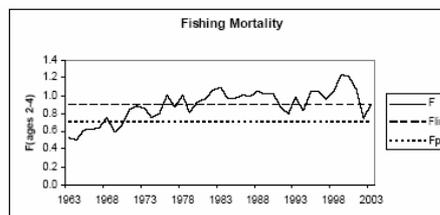
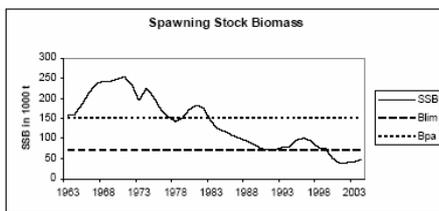
2. Problem definition

2.1 Issue requiring action

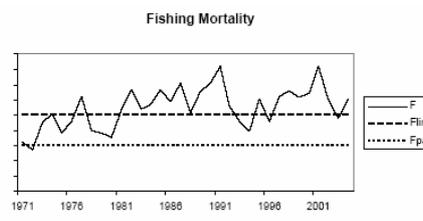
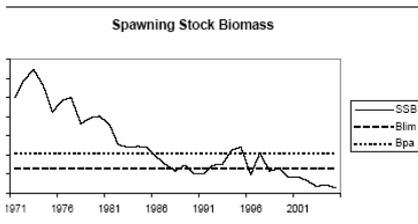
The cod recovery plan adopted in 2004 has not delivered reduction of fishing mortality on the four cod stocks it covered to the extent considered necessary for stock rebuilding. Agreed reductions in TACs, additional technical measures and complimentary effort management regulations have been far from sufficient to reduce fishing mortalities to levels required to allow the cod stocks to rebuild. Scientific advice continues to be for zero catch. The situation of cod stock is illustrated below and further explained in Annex 2.

- Trends in SSB and fishing mortality in the cod stock in:

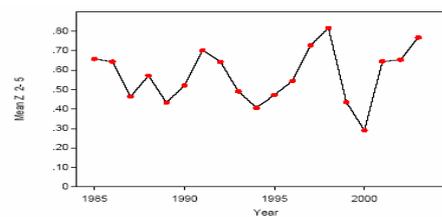
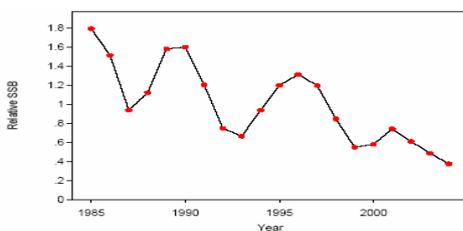
1) the North Sea, Skagerrak and eastern Channel



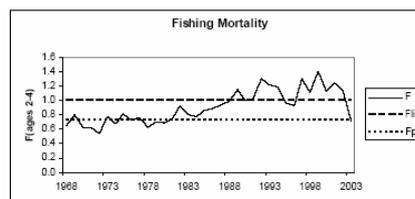
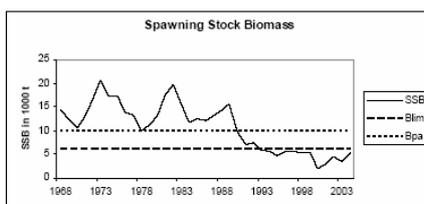
2) the Kattegat



3) the west of Scotland



4) the Irish Sea



⁶ http://www.nsrac.org/advice/wd20060323_Position_cod_recovery.pdf

⁷ http://www.nwrac.org/Publications/Publications_ENG/Navigation.php?cats=0&language=English&year=2007

STECF has detected certain areas of the existing plan that need adjusting in order to bring about the recovery of cod stocks and the Commission is responding to that by proposing the revised measures. STECF drew attention to the following issues, in which the existing plan has delivered less than expected. These are:

- fishing mortality and effort have remained too high;
- high-grading, discarding and mis-declaring of cod have compromised the intended impact of effort management;
- efficiency of implementing Annex II was not sufficient (decrease in fishing effort according to specific gear in all areas covered by Annex II)
- a difference between 'days at sea' and 'real days at sea' was detected;
- the plan included too many derogations;
- available derogations were not defined clearly and therefore they were too easily used by member states as exemptions from the rules.
- days at sea (Annex II) were not reduced sufficiently.
- the baselines from which the effort were estimated were too high
- the existing rules resulted in concentration of fishing effort on cod grounds.

Four possible issues contributing to the inappropriate performance of the plan have been examined; one related to poor enforcement and three reasons for excessively high effort levels.

The contribution of poor enforcement has been examined. Although there are still concerns about control, such as enforcement of landing and problems with catch composition in some areas i.e., this appears as a less important issue in this case, given that most recorded landings are within quotas (and in some areas are much smaller than quotas) and effort levels are within permitted levels. Moreover, enforcement is a general problem within the framework of the Common Fisheries Policy and it will be addressed and reviewed in 2008.

Effort levels are too high, however. This arises from (a) an inappropriately high baseline chosen at the start of the plan; (b) an insufficiently specific in-year objective for effort reductions established in the plan, and (c) a substantial number of complex derogations allowed for vessels retaining reduced quantities of cod on board. The outcome has included high overall effort levels and a strong incentive to discard cod.

DG FISH's approach has been to re-examine the targets and in-year objectives in order to make them more specific, more measurable and more attainable. A difficulty was that attaining the annual objective – a 30% increase in spawning stock size – required both a precise scientific advice and a willingness by Member States to implement some extremely large variations in fishing effort which would have swung between closing many businesses and providing years of relative ease. This caused both political difficulties in adopting implementing regulations (as Member States sought complicated exemptions for specific sectors). Furthermore, the necessary scientific forecasts were not available in many cases, which created a legislative void and led to *ad-hoc* decisions, based on short-term considerations and not long-term objectives.

In order to direct fishing effort away from cod, ways to decouple fisheries should be found.

The revised regime would include the cod stock in the Celtic Sea, which is not part of the current cod recovery plan but it has also been evaluated as being harvested unsustainably and overexploited. At the time of adoption of current plan, the stock was not in need of recovery measures but has since deteriorated.

The cod stock in the Baltic is not covered by the proposed measures as it is subject to separate recovery regime⁸, which entered into force on 1 January 2008.

2.2 Underlying driving forces

It is widely recognised that the cod stocks are at a very low level and strong restrictive measures on fishing would be needed to ensure recovery of these stocks. If the cod could be fished separately and if cod fisheries could be managed separately, there would be a strong case for closing such fisheries and prohibiting cod landings.

In very many cases however, the cod are caught in mixed fisheries along with other species such as haddock, whiting, Nephrops and anglerfish. As cod abundance is now low, the fisheries now depend for their incomes on these other species. This creates a strong economic driving force to maintain fishing effort in the mixed fisheries at a higher level than is appropriate for cod recovery.

This means that economic and social pressures exist which have led to fishing effort levels and (to a lesser extent) cod TACs being set higher than those corresponding to the Cod Recovery Plan. Higher effort levels have been accompanied by sets of rules concerning the composition of catches (i.e. obligations to catch smaller proportions of cod) but such rules have proven difficult to enforce. As a result, the depleted cod stocks continue being fished outside safe biological limits⁹ (see also Glossary in Annex 3).

2.3 Effect on the sector

2.3.1 Identification of the sectors affected

From 1 February 2004 the cod recovery measures apply to the following geographical areas¹⁰:

- Kattegat (ICES Division IIIa south)
- Skagerrak and North Sea (ICES Divisions IVa, b, c, IIIa north and IIa EC) and Eastern Channel (ICES Division VIIId)
- West of Scotland (ICES Division VIa)
- Irish Sea (ICES Division VIIa)

These areas are referred to as the 'Cod Recovery Zone' or 'CRZ'.

Vessels and gears covered by the 2004 Cod Recovery Measures are as follows:

⁸ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0411:FIN:EN:PDF> (Council Regulation 1098/2007 establishing a multi-annual plan for the cod stocks in the Baltic Sea and the fisheries exploiting those stocks)

⁹ <http://www.fishonline.org/information/glossary/>

¹⁰ http://ec.europa.eu/fisheries/press_corner/pictures/carte_ices_en.jpg

The EC Regulation provides that all vessels of 10 metres or more in overall length carrying certain gears in the CRZ are subject to limits on the number of days they may spend at sea.

The following gears are covered by the cod recovery measures:

- demersal trawls, seines (including anchor seines) or similar towed gears of mesh size equal to or greater than 100mm except beam trawls;
- beam trawls of mesh size equal to or greater than 80mm;
- static demersal nets including gill nets, trammel nets and tangle nets;
- demersal longlines;
- demersal trawls, seines or similar towed gears of mesh size between 70mm and 99mm except beam trawls with a mesh size between 80mm and 99mm;
- demersal trawls, seines or similar towed gears of mesh size between 16mm and 31mm except beam trawls.

The principal sectors affected by the cod recovery plan are the owners, operators and crews of demersal fishing vessels operating in the EU waters.

This economic analysis estimates the effect of the Policy on the fishing fleets catching cod, of which the North Sea is the most important and therefore indicative of trends in other areas.

The main fleets catching and landing cod in the North Sea, Skagerrak and Eastern Channel are depicted in a graph below.

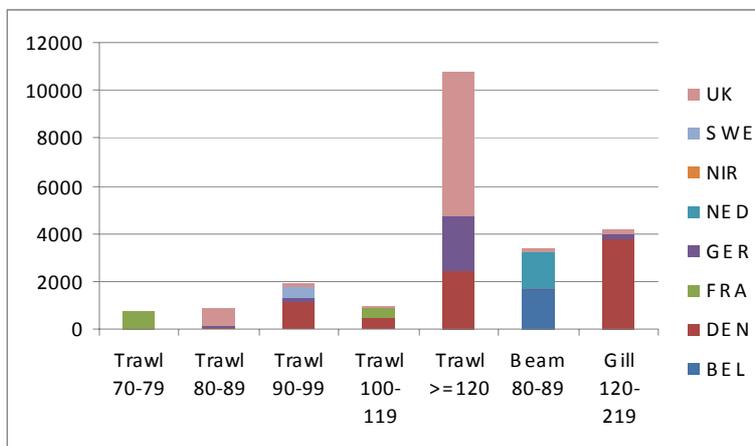


Figure 1 Landings of cod (in tonnes) by Member State and major gear type for 2005 from the North Sea, Skagerrak and Eastern Channel. Source: STECF.

Table 1: Cod landings and cod dependency of main North Sea fleet segments

2005 landings (tonnes)	North Sea	Skagerrak	Eastern Channel	Total
Belgium	1,715		50	1,765
Denmark	6,291	3,613		9,904
France	515		467	982
Germany	2,648			2,648
Netherlands	1,659		9	1,668

Sweden	306	824		1,130
UK	8,031		179	8,210

The following "economic" fleet segments have been identified as catching the largest proportion of North Sea cod:

Denmark: Demersal trawlers and seiners 12-24m, Polyvalent passive gears 0-12m, and Polyvalent passive gears 12-24m

UK: Demersal trawlers and seiners 12-24m and Demersal trawlers and seiners 24-40m

Germany: Demersal trawlers and seiners 24-40m

Belgium: Beam trawl 24-40m

Netherlands: Beam trawl 40m+

Table 2: Cod landings and cod dependency of main North Sea fleet segments

Country	Segment	2005		
		Boats	Landings (million €)	Cod dep. of total segment
Denmark	DTS 12-24	265	16.2	28%
	PGP 0-12	324	11.7	50%
	PGP 12-24	116	8.9	32%
UK	DTS 12-24	NA	NA	4%*
UK	DTS 24-40	NA	NA	9%*
Germany	DTS 24-40	NA	5.4	29%
Belgium	TBB 24-40	60	3.4	5%
Netherlands	TBB 40m+	100	1.7	1%

NB: *Value for 2004

These segments provide the basis for the economic assessment and would also provide insight to the probable impacts of fleets with lower levels of cod landings such as Sweden and France to name but a few. Furthermore, UK vessels (primarily Scottish-based vessels) will have similar important fishing operations in the West of Scotland and Celtic Sea areas, where cod is also targeted.

2.3.2 Effect of the regulation

- **Kattegat (ICES Division IIIa south)**

The 90+ mm trawl fleet accounts for 80 % of the cod catches and 70 % of the total fishing effort in the Kattegat. The fleet mainly targets Nephrops, plaice and sole with cod as an important by-catch especially in the first quarter of the year. The gill netters (4cii and vessels 38 below 10 m) are responsible for 15 % of the cod catches. Gill netters are mainly targeting flatfish but may have cod as the target species in December and the first quarter of the year. There is evidence of misreporting of landings (non-reporting and misreporting by fishing area) in recent years and the official reported landings figures may underestimate landings. In addition substantial quantities of undersized as well as legal sized cod are discarded. However, available information indicates that catches have declined in recent years as a consequence of the low TACs.

The technical measures applicable for the 90 mm towed gear fleet fishing in the Kattegat are different from the measures for the North Sea. The main difference is the acceptance of cod as a target species for the 90 mm fleet in the Kattegat. 90 mm is far from the optimal mesh size for cod and may result in a suboptimal exploitation pattern if the gear is used as a target cod gear. There is no biological

justification for having different mesh size – target species rules in the Kattegat and Skagerrak compared to the North Sea.

The days at sea system appears to have had some effect on overall deployed effort (-25%) between 2002 and 2005. However, the low allowed number of days at sea for trawls >100mm and the additional technical restrictions for 70-89mm trawls in 2004 and 2005 caused a shift in the fishing pattern with an increase in 90-99mm trawl effort. As explained above, another explanatory factor for the concentration to 90-99mm trawls is that in contrast to other waters, 90-99mm trawls in the Kattegat and the Skagerrak has no limitations regarding catch composition.

In conclusion, the cod recovery measures implemented in the Kattegat in terms of TACs, maximum days present in the area by gear category and selectivity devices have not been sufficient to reduce the fishing mortality on cod to levels that would allow the cod to rebuild.

- **Skagerrak and North Sea (ICES Divisions IVa, b, c, IIIa north and IIa EC) and Eastern Channel (ICES Division VIId)**

Management measures applied to this stock have not yet been sufficient to allow rebuilding. Although the most recent stock assessment indicates a recent reduction in fishing mortality, the estimates are subject to high uncertainty, and fishing mortality is still high.

Over the last five years there has been a substantial reduction in the amount of effort by trawlers in the North Sea. However, there are also important fisheries on the stock in the Skagerrak and the Eastern Channel, and there does not appear to have been any corresponding reduction in effort in these fisheries. Clearly, management needs to address these fisheries as well as those in the North Sea. This is particularly important in the light of cod stock structure information which suggests that the overall population is a meta-population in which a series of smaller sub-stocks contribute to the whole. Failure to adequately apply measures to protect all components may be contributing to shortfalls in recovery.

In common with other areas there is a need to look at the range of mesh sizes in use throughout the area.

- **West of Scotland (ICES Division VIa)**

There are signs that days at sea restrictions may have limited effort of vessels using mesh of ≥ 120 mm but no indication that this has been the case for vessels using mesh of 100-119mm where other factors (principally technical gear regulations) are believed to have accounted for changes in nominal effort recorded.

Given current stock status and fishery practices cod bycatch is not significant in the fishery using 70-89mm gear and targeting Nephrops. Allowing this fishery a higher days at sea allowance than vessels using larger mesh gears does not appear to constitute a perverse incentive.

The presence of the West of Scotland management line has meant it is possible the majority of cod landings from VIa could be from vessels unaffected by cod recovery measures and unrestricted in their catch composition.

Overall, given the latest stock assessment has indicated continued decline in SSB to 2005 and fishing mortality over ages 2 to 5 is still well above Flim and not decreasing, there is no indication to date that the various measures introduced to protect cod in this region have enabled recovery in the stock.

- **Irish Sea (ICES Division VIIa)**

TAC's are not restrictive as reported catches are well below TAC levels since 2000 (with the exception of 2001). The otter trawl fisheries (70 – 89mm and 100 – 119mm) each account for 21% of 2005 catches, the beam trawl fleet (80 – 99mm) 14% and otter trawl fleets (70 – 89mm and 100 – 119mm) operating under the 2002 5% special conditions account for 9 and 17% respectively. The remainder is attributed to gill nets (less than 110mm) 5% and 12% of catches attributed to an undefined gear category.

There has been an overall decline in effort in the 100 – 119mm otter trawl fleet, this reduction in effort has been reflected in an associated reduction in catches (from ~450 to ~200 tonnes). However, there has been no apparent change in reported effort in any of the other fleets.

Days at sea regulations were introduced into VIIa in 2004, it is too early to determine if effort regulations are yet constraining fishing effort. Modifications to days at sea regulations could provide strong incentives to encourage a single species *Nephrops* fishery. The current baseline level is not restrictive and therefore fails to provide any incentive to adopt more selective fishing techniques in order to obtain additional effort allocations.

The Irish Sea closed area has been in place since 2000, however the objective of this closure is not clear – to reduce fishing mortality or to allow cod to spawn. Recent trends in fishing mortality suggest that the closure has been of limited benefit, although it is difficult to disentangle the effectiveness of this particular measure in isolation. However, it is likely that the effectiveness of the area closure has been diluted because of several derogations, the alteration of the closure limits and evidence of effort displacement to the outside of the closed area.

Overall, there has been no clear evidence to suggest that the recent measures have resulted in a significant reduction in cod mortality.

- **Celtic Sea (ICES Division VIIe k)**

Cod in Divisions VIIe k are taken in mixed trawl fisheries. Landings are made mainly by French gadoid trawlers, which prior to 1980 were mainly fishing for hake in the Celtic Sea. Landings of cod by French *Nephrops* trawlers have fluctuated between 10% and 20% of the total French cod landings from this stock in recent years. Since 1988, Irish landings have accounted for on average 14% of the total, but in the last two years accounted for around 29%. UK and Belgium have contributed on average to 9% and 4%, respectively. Landings occur throughout the year, but mainly in the winter months during November to April, with a peak in February March.

Council Regulation (EC) No. 27/2005, Annex III, part A 12 (b) and Council Regulation (EC) No. 51/2006, Annex III, part A 4.2 prohibited fishing in ICES rectangles 30E4, 31E4, and 32E3 during January March 2005 with some derogations in March, and during February and March 2006. The Council Regulation (EC) No 41/2006 reinstated the closure in February March 2007. The direct impact of this closure on the status of cod cannot be quantified. Since 1999, French fishing effort has decreased considerably: by 50% for all trawlers and by 65% for the gadoids fleets during the first quarter. This reduction is mostly due to a decrease in the number of vessels involved rather than to a reduction of the mean fishing time per vessel. Although this effort reduction has been initiated before the first year of the closure, the closure has probably been a strong incentive to a further reduction in effort of vessels targeting gadoids.

Technical measures applied to this stock are: a minimum mesh size for beam and otter trawlers in Subarea VII and a minimum landing size (MLS) of 35 cm. For Belgian trawlers that land in Belgium the MLS is 40 cm. Minimum landing sizes do not prevent cod from being caught (and thrown back dead), but might prevent targeting juvenile cod. Recent sampling programmes in countries exploiting this stock indicate that discarding is high and variable. They may account for 40-60% by number of all fish caught. These discards are mainly under the MLS. Qualitative analyses of observations at sea in 2005 have shown that discarding is more prominent in Divisions VIIe and VIIf,g than in VIIh,k, where small fish are less abundant.

Management regulations, particularly effort control regimes in other areas (Division VIIa, Subareas VI & IV), have become increasingly restrictive since 2004 and should not be allowed to result in a displacement of effort into the Celtic Sea.

2.3.3 Magnitude of the effect on the sectors

Cod stocks have declined drastically throughout Community waters over the last few decades. In the North Sea, annual landings of cod declined from an average of around 250,000 tonnes between 1965 and 1985 to around 20,000 tonnes by 2007. The spawning stock biomass is thought to have declined over the same period from more than 250,000 tonnes to much less than 70,000 tonnes. Similarly in the Irish Sea, cod landings have decreased from peaks of around 15,000 tonnes to around 1,500 tonnes per year, with the spawning stock biomass now estimated to be only around 2000 tonnes. The decline in cod to the west of Scotland seems to have been even more dramatic, and the stock is in a worse state than that in the North Sea. Landings from this stock have declined from around 20,000 tonnes in the late 1980s to 500 tonnes in 2004. The current spawning stock biomass is believed to be at an extremely low level. In the Kattegat, the spawning stock biomass has declined from around 35,000 tonnes in the 1970s to what are now thought to be very low levels, perhaps of just one or two thousand tonnes. Similar dramatic trends have been observed in other cod fisheries.

The economic loss to the sector and to society brought about by the decline in stocks has been very substantial. Rebuilding of cod stocks to previous levels would allow increasing catches to levels above 150 000t and possibly as high as 250 000t. The extent of the increase will depend on climatic changes in the next decades, and cannot be forecast precisely.

2.4 Recent economic performance

This section outlines the main economic indicators of the North Sea fleet segments that target cod.

The Belgian and Dutch fleet segments have a low cod dependency (see table 2) but nevertheless play an important role, since cod recovery measures tend to overlap with sole and plaice management measures.

- **Analysis of Danish fleet**

All segments have seen a steady decline in cod landings (volume and value), cod dependency and gross cash flow during 1999-2004. This is in line with declining cod quota in the North Sea over the same period. From this data it is more difficult to see what the impact has been on other species targeted in the mixed fishery and how economic performance has subsequently been affected.

Detailed economic performance indicators of the Danish fleet segments for 2002-05 show a general reduction in cod dependency and a poor profit evolution over the period, with declining revenues and negative profits.

- **Analysis of UK fleet**

Similar to the Danish evolution, the UK cod fishery has seen a steady decline in recent years.

The direct impact of reducing cod catches further may have a limited impact, at least at the aggregate fleet level. Without individual vessel data it is impossible to gauge how each fisherman will be impacted. Haddock catches of both fleets, and Norway lobster for the <24m fleet segment, clearly outweigh the economic contribution of cod.

The European TACs for the North Sea fisheries have declined since 1999, but have stabilised since 2004. The reduction in the cod TAC, as a consequence of the recovery plan, is notable. However, the reduction in available whitefish quota has led to a diversification towards the Nephrops fishery by UK operators, in particular for the <24 m fleet. Due to this shift in fishery operations, and improving prices on the market, the UK value of these fisheries has nevertheless increased steadily since 2003. This improvement has been most noticeable in the last couple of years.

Overall profit levels in the UK have suffered due to a substantial increase in fuel costs. Imposing cod recovery measures has also led to increasing operating costs, with fishermen sometimes being forced to invest in additional quota and days at sea to remain an economically viable operation. For example, for 2007 it has been predicted that a demersal trawler >24 metres can expect to invest a further € 64,000 on quota leasing and € 30,000 on day purchasing, amounting to 5% of total earnings.

The current proposal to revise the cod recovery plan primarily foresees options to decouple TAC and effort limitations of various species caught in the mixed fishery. The decoupling approach - the "cod avoidance plan" - assumes that technical measures can be put in place (e.g. closed areas, seasons, gear selectivity) that allows a reduction in cod catches whilst upholding the catches of other species caught in the mixed fishery. This foresees a reduction in fishing mortality, seeking to obtain a cod fishing mortality of 0.4.

Against this background a number of plausible scenarios have been simulated and economic impacts in the long term assessed. No analysis of the transition to long term recovery could be made without further substantial biological assessments.

2.5 Legal basis for Community action

Council Regulation (EC) No 2371/2002 of 20 December 2002 on the Conservation and Sustainable Exploitation of Fisheries Resources under the Common Fisheries Policy¹¹ provides for the establishment of recovery plans for stocks outside safe biological limits (Article 5) and for management plans for fisheries exploiting stocks within safe biological limits (Article 6). In practice, long-term plans need to be able to cater for situations where a stock may either be outside safe biological limits and then recover, and where a stock may be inside safe biological limits and then later fall outside safe biological limits and require recovery measures. Because of this practical difficulty, these articles are currently under review.

¹¹ OJ L 358, 21.12.2002, pp. 59-80.

<http://eur-lex.europa.eu/LexUriServ/site/en/consleg/2002/R/02002R2371-20030101-en.pdf>

Council Regulation (EC) No 2371/2002 also requires the sustainable exploitation of fish stocks, and provides for the use of instruments such as the management of fishing effort, and limitations on catches.

While Regulation (EC) No2371/2002 is being reviewed, it is appropriate to use Article 37 of the Treaty establishing the European Community as a legal basis.

2.6 *Necessity and subsidiarity*

This proposal concerns the annual setting of a TAC for fish stocks that are shared between Member States according to a fixed allocation. Management of the shared resource in those areas therefore must affect these Member States in exactly equal proportion. It is not possible for Member States to do this by independent or devolved action. Fisheries management is an exclusive Community responsibility and therefore, it is necessary that this management action be implemented in Community legislation.

The proposal requires Member States to develop detailed implementing rules concerning the management of fishing effort at a local level. Experience has shown that such rules cannot be managed efficiently at a Community level.

3. Objectives

3.1 *General objective*

The objective of the revised plan is to ensure a recovery of cod stocks in order to achieve sustainable cod fisheries.

Policy coherence concerning sustainability objectives should be maintained. The plan should conform to the objectives of the Common Fisheries Policy 'to apply the precautionary approach in taking measures to protect and conserve stocks, to provide for their sustainable exploitation and to minimise the impact of fishing on marine ecosystems' (Article 2 of Regulation (EC) No 2371/2002). The Community aims at a progressive implementation of an ecosystem-based approach to fisheries management, which contributes to efficient fishing activities within an economically viable and competitive fisheries industry. In addition, such plans should contribute to the aims of the Implementation Plan agreed by the World Summit on Sustainable Development at Johannesburg in 2002, especially in respect of exploiting stocks compatibly with maximum sustainable yield¹². This political objective has been the subject of a separate Commission Communication (Implementing sustainability in EU fisheries through maximum sustainable yield (COM (2006) 360)¹³ and accompanying working document (SEC(2006) 868)¹⁴.

A renewed cod recovery plan should provide for healthy, stable and profitable fisheries to be developed and maintained. This includes a fishery catching cod, but the linkages with other fisheries need to be taken into account (i.e. plaice and sole, Nephrops, haddock and saithe fishery) and the management plans for those should be considered from the outset when renewing the cod recovery measures.

¹² www.un.org/esa/sustdev/documents/WSSD_POI_PD/English/POIToc.htm

¹³ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2006:0360:FIN:EN:PDF>

¹⁴ www.cc.cec/home/dgserve/sg/sgvista/i/sgv2/repo/repo.cfm?institution=COMM&doc_to_browse=SEC/2006/0868

3.2 *Operational objectives*

The operational objective of the existing plan has been to set TACs that result in 30% increases in the SSB from one year to the next. This has proven too ambitious and hence unworkable.

The previous plan suffered from unclear operational objectives, especially in the event that scientific advice did not include forecasts of catches and stock sizes. New and measurable objectives are needed.

Firstly, the plan should provide for setting TACs at levels linked directly to the current state of the stock concerned, in such a way that the stock will recover

The outcome of this rule should be measured by monitoring the levels of fishing mortality and comparing this with the rate that will deliver the maximum sustainable yield (MSY)¹⁵. Measures of the rate of fishing mortality from scientific agencies should be available on an annual basis.

4. Policy options

4.1 *The 'status quo' option – leaving current plan unchanged*

In answer to a drastic decline of cod stocks in EU waters, the Commission proposed in 2004 a multi-annual strategy to bring about cod recovery over period of between 5 and 10 years. The cod recovery measures, covering four cod stocks: cod in the North Sea, Skagerrak and Eastern Channel, cod in the Kattegat, cod to the west of Scotland, and cod in the Irish Sea, was a commitment by the Council of Ministers that it would set TACs and effort limits according to predefined rules in response to the latest scientific advice. These predefined rules are called harvest control rules. The harvest control rules under the cod recovery plan require that the TAC be fixed each year at a level that scientists estimate would result in a 30% increase in spawning biomass (SSB), until the precautionary level (B_{pa}) is achieved. This is the level of biomass that scientists consider to be a safe biological limit to avoid stock depletion. However, the resulting TAC is constrained to be within 15% of the previous year's TAC, provided that the stock biomass is above the level that gives a high risk of stock collapse (B_{lim}). If the stock is below B_{lim} , more stringent TACs should be fixed, but it is not specified how these should be decided. Furthermore, the recovery plan requires that the effort of fishing vessels fishing for cod should be adjusted in line with the changes in fishing mortality.

Unfortunately, according to ICES and STECF, regulations adopted in 2002 and 2004 and intended to reduce fishing mortality (F) on the cod stocks in order to help them recover above biomass limit have not delivered their goal. As an example: the necessary reduction of 65% on North Sea cod fishing mortality has not happened and changed from $F=0.868$ in 2002 to $F=0.859$ in 2005. More improvement was observed in 2007 ($F=0.59$) but it was still not sufficient to ensure a substantial recovery of the stock (see STECF¹⁶ reports on lack of progress of current Cod Recovery Plan and inefficiency of the regime)

Furthermore, the single cod recovery zone extending over such a wide area creates a possibility of effort to shift around within the overall zone, leading to inappropriate pressure on different stocks within the zone, confounding the prospects of recovery.

¹⁵ http://en.wikipedia.org/wiki/Maximum_sustainable_yield

¹⁶ http://ec.europa.eu/fisheries/publications/factsheets/legal_texts/sec_2007_473_en.pdf

The existing stratification of gears by management areas (Annex II system, Council Reg.41/2007) is capable of achieving the management targets only if effective effort reductions for all fleets that contribute to cod catches can be achieved. STECF notes that so far, the majority of incentives provided through species selective derogations intended to avoid cod catches, are hardly used by the fishing industry.

4.2 *Improving enforcement*

The policy option of retaining the current legislative proposal but improving enforcement must be considered.

4.3 *Closing the fishery*

Complete closures of the cod fisheries to rebuild the stocks have been considered as one of the possible management options. Such drastic measures would have very substantial social and economic consequences because other commercially important species (such as haddock, whiting, anglerfish and Nephrops) are caught in the same fisheries.

Despite exhaustive analysis, no practical candidates for closed areas to protect cod have been identified. The difficulty is that cod are very widespread, and the closure of any specific zone is (if implemented without effort reductions) likely to move fishing effort into a different area where it is likely that more cod will be caught.

4.4 *Using economic instruments*

In the context of seeking ways to achieve recovery of depleted cod stocks, the use of economic instruments has been considered. It is recognised that economic instruments can increase the efficiency and cost-effectiveness of environmental management, create incentives for investment and generate financial resources for preserving biodiversity.

However, the use of policy-specific economic instruments is not foreseen under the Common Fisheries Policy. The broad approach since the inception of this policy has been that conservation instruments are used at Community level to establish fishing opportunities that are then allocated to Member States. The management and uptake of those fishing opportunities has been a matter for Member States, although scope exists for co-financing of some measures from Community structural funds (EFF)¹⁷

This proposal is prepared with the current legal basis of the CFP which does not allow for the use of economic incentives as primarily conservation instruments.

4.5 *Simplifying and strengthening the Cod Recovery Plan*

This option proposes revising the current cod recovery measures in order to provide simpler and clearer rules for setting TACs and effort levels.

This option comprises several components, which are described below:

¹⁷ <http://europa.eu/scadplus/leg/en/lvb/l66004.htm>

4.5.1 Changing from a biomass-based target to a fishing mortality-based target

Instead of aiming for a 30% annual biomass increase, the Community should instead move gradually towards a fishing mortality that will deliver stock recovery and eventually high yields.

The annual adaptation towards the fishing mortality objective could be adjusted according to the state of the stock, such as:

- Stock below limit biomass: 25% reduction;
- Stock above limit biomass but below precautionary biomass 15% reduction;
- Stock above precautionary biomass: 10% reduction.

These percentage reductions would be applied to permitted levels of fishing effort and to the fishing mortality rate used as a basis for calculating TACs. The 15% limit on inter-annual changes in TACs would be retained, except in the case of the stock below limit biomass: here the 15% constraint in TACs would generally prevent a real reduction of 25% in fishing mortality. In such a case, the inter-annual TAC constraint should be at 25%.

Scientific agencies have indicated that high yields of North Sea cod can be taken in the range of fishing mortalities from 0.2 to 0.4. Corresponding estimates are not available for other stocks of cod, but in their absence analogous rates can be applied while further research is developed.

4.5.2 Action to take in the absence of catch forecasts

Should scientific committees fail to provide a catch advice corresponding to the implementation of the plan, a 15% reduction in TAC and in relevant effort should be applied. Similar reductions should continue to be applied until the size of the spawning stock (as measured directly by survey catch rates) exceeds by 20% the spawning stock as measured by survey catch rates in a previous historic time period when the stock was known to be close to a precautionary biomass level.

Although there may be different reasons why scientists cannot provide analytical catch advice, these may not be easy to distinguish in legislation. In these circumstances, a 15% reduction can be a compromise between the more extreme scenarios above for data-rich situations and falls within the 15% inter-annual limit that industry considers acceptable.

This proposed system would overcome the current difficulties related with the poor scientific advice (which makes it difficult to apply strictly the current plan) and would establish clear rules in all circumstances, thus avoiding ad hoc negotiations in the December Council.

4.5.3 Decoupling Options and identifying vessels catching cod

Experience has shown that it is necessary to strike a balance between reducing fishing effort directed at cod, and allowing fishing to continue on other species. It has proven impractical to build systems to do this in Community legislation, because of the highly detailed and very local nature of the issues to be addressed. One option to consider is to devolve responsibility for this aspect of management of cod recovery to Member States.

No decoupling:

This is the option where regulations affecting vessel operations are relatively light and vessels are not very restricted in where they fish, what gear they use or what mixture of species is retained on board.

Management measures would depend strongly on management of the size of the fleet and on overall days-at-sea.

Decoupling:

An alternative approach is to seek to "decouple" fisheries that target different stocks. This entails operational disadvantages including complicated regulations. However, it allows the possibility to better manage each of the resources separately, and to match the fishing on each resource to the productive capacity of that resource more efficiently. Importantly, it removes the need to reduce overall effort and fleet capacity to the level that the weakest stock can withstand.

The implementation of decoupling could be devolved to Member States. The complex list of special conditions in the effort management scheme could be replaced with a single provision: that vessels are allowed a less strict limitation in fishing effort if they fish under a "cod avoidance plan" which would be managed by Member States subject to minimum conditions established at Community level, including provisions concerning access to data and provision of biological samples. Cod avoidance plans could be widely different in nature between different vessels. Some examples could include:

- vessels operating with fishing gear or in areas where cod catches are most likely to be very low, e.g. creel and pot fisheries;
- vessels accepting a commitment to catch less than 5% cod and accepting observer validation of their catches;
- vessels opting-in to a short-notice temporary closure system designed to reduce cod by-catches.

Because of their bottom-up nature, the cod avoidance plans (CAPs) are an industry-led instrument but their efficiency needs to be tested. At this point in time CAPs cannot be compulsory.

4.5.4 Options for effort management

Under the existing days-at-sea system the total permissible effort – that is, the kW-days of fishing effort that would be developed if all vessels used all the days they are allowed under "Annex II" limits – is substantially in excess of real deployed effort. Options are therefore necessary to re-establish a baseline of fishing effort at a real recent level and to base further reductions from this level.

The central option considered here is to develop effort limitations for groups of vessels with separate overall kW-days limits for each Member State. The overall limits could be established at recent level, notionally the average 2005-2007 level.

5. Analysis of impacts

5.1 Environmental impacts

The environmental impact of fishing is developed in approximate proportion to the amount of fishing effort deployed. Two broad categories can be defined.

When fishing for some target species, some quantities of non-commercial species can be caught by accident. In the demersal fisheries these are principally harbour porpoises and dolphins caught in gill nets, a variety of benthic invertebrates caught in beam-trawls, and non-commercial species caught in other fishing gear (e.g. boarfish, dragonets, etc.).

Secondly, the mortality rate of commercial species can be unnecessarily high. For overfished stocks, the stock sizes are brought down to lower levels than necessary for taking the highest catches and to levels where their productivity is reduced. This has three environmental consequences:

- the availability to predator species (e.g. other fish species) in the ecosystem is reduced;
- more fuel has to be burnt in order to maintain commercial catches;
- more small fish are discarded, because the abundance of larger fish is relatively low;
- the impact on non-commercial species is higher, e.g. by causing changes in species interactions due to higher food availability through discards

Overfishing also generates a need to use smaller-mesh nets because of the relative scarcity of the larger fish in the sea, which in turn will increase discards, particularly of juvenile fish.

It is not normally possible to predict long-term trends in fisheries productivity. Changes in oceanic climate including global warming, and currently unexplained medium-term changes in recruitment can lead to significant trends in productivity. However, it is known that keeping fisheries impacts at levels no higher than those needed to take high yields improves the stability of the stock and improves the robustness of the fishery to adverse environmental effects. Implementing a plan which will lead to fishing mortalities necessary for the recovery of cod stocks will therefore lead to improved stability in the industry.

5.2 Economic impacts

This assessment focused on the fishing fleets catching cod in the North Sea area, as this is the only area where the economic data exists to allow the evaluation.

- **Status Quo**

This scenario is based on similar projections of TAC and effort levels for cod and other species in the mixed fishery, as experienced during 2002-07. The status quo scenario assumes a North Sea cod SSB of 36,000 t and a TAC of 22,000 t in the long term, i.e. the assumption is that recovery measures are not effective and cod catches stay at their present low levels. The breakdown of projections for the status quo option (for details see Annex 1) clearly shows that keeping the current regime in place would be less profitable for the fishing industry than implementing the revised rules.

- **Improving enforcement**

Recent analyses indicate that there is not a significant problem in enforcement in that reported landings are within permitted levels and deployed effort is well within permitted levels. Enforcement is believed to have improved recently and is not the major component of the overfishing problem. Increased enforcement is not likely to have a major economic effect on many parts of this sector.

- **Fishery closure**

Closing all demersal fisheries in order to protect cod would cause major disruption of markets. The 2008 TACs (in tonnes) for the above mentioned species in the four cod recovery areas, which are

covered by the current Cod Plan equal: haddock – 66,999t; whiting – 39,883t; anglerfish – 44,580t and Nephrops – 91,956t.

The analysis of the catch composition data from the Skagerrak, North Sea and Eastern Channel for the year 2006 shows that cod catches accounted for only 4.75% of all demersal catches in the area.

Catches in 2006 (tonnes)			Percentage (%)	
Total	cod	other species*	cod	other species*
65,389	3,263	68,652	4.75	95.25

* anglerfish, haddock, hake, Nephrops, plaice, sole, whiting, saithe

These catches would be substantially reduced if fisheries catching cod were to be closed. The duration of such a closure would be of sufficient extent that liquidation of a large part of the catching sector and associated businesses is a likely outcome.

- **Use of economic instruments**

Economic instruments can increase the efficiency and cost-effectiveness of environmental management, create incentives for investment and generate financial resources for preserving biodiversity. If well designed and used within the right policy and enforcement framework, economic instruments such as fiscal instruments and charges, financial assistance or the introduction of property rights and liability systems can increase returns to activities that conserve valuable biological diversity while discouraging behaviour that is detrimental to species and ecosystems. However, for legislative reasons the specific use of such measures is not examined further at this stage.

- **Revised cod recovery plan**

The economic analysis presented here is based on the assumption that cod will recover to its historic levels of 150 000 to 250 000t in the North Sea. Impacts are assessed according to a variable extent of decoupling.

In order for the cod stocks to recover, the fishing mortality rate (F) needs to be gradually reduced to F0.4, as estimated by scientists (ICES). It is not possible to establish a clear timeframe as we are dealing with natural resources, which can be influenced by many factors (i.e. global warming).

The decoupling scenario is based on the limitation of effort and TAC levels as follows:

- 37% reduction in fishing effort for the 120mm fleets of Denmark, UK and Germany
- Unchanged effort for the 70-99mm fleets of Denmark, UK and Germany
- 48% reduction in fishing effort for sole and plaice (Belgium and Netherlands beam trawl)
- Rise in sole TAC of 25%
- Unchanged TAC for other species

If decoupling is not possible we assume the following:

- 37% reduction in fishing effort for 120mm and 70-99mm fleets of Denmark, UK and Germany
- 48% reduction in fishing effort for sole and plaice (Belgium and Netherlands beam trawl)

- Rise in sole TAC of 25%
- 20% reduction in Nephrops TAC
- Unchanged TAC for other species

Other impacts under the plan

It is most likely that further cuts in days at sea and quota will lead to some operators purchasing extra days and/or leasing other quota. These extra costs, as already experienced in the UK in particular, will rise and put further downward pressure on profits. The modelling of economic impacts does not incorporate such additional costs.

A further reduction in the availability of North Sea demersal species will likely have an impact on fish prices over time. Without further econometric analysis into price flexibilities, and the examination of other market dimensions (e.g. supply of aquaculture, imports), we can only assume that price trends continue as in recent years.

Continued pressure of rising fuel costs is anticipated. However, this pressure is not unique to the cod recovery plan and is thus not explicitly accounted for.

In general, the cod TAC increase from the current status quo scenario of 21,000 to 150,000/250,000 as assumed under the revised plan would result in substantial gains for all fleets catching cod in long-term. The small scale vessels (i.e. Danish PG 00-12) may be an exception here.

Decoupling effort in the long term has a very positive effect due to reduction in effort days and hence vessel costs (assuming that catch per unit of effort compensates the reduction in effort, i.e. that the TAC can be caught).

The economic analysis shows that a revised plan would undoubtedly mean a short term decrease in cod landings but this would be followed by substantial long term future gains for the fishing industry.

5.3 Social impacts

The social impacts of the "Status quo", "Improving enforcement" and "Fishery closure" options follow directly from the employment consequences of the economic impacts presented in the previous section.

The "Revised cod recovery plan" scenario is addressed in more detail here.

In order to offset the high fuel costs in overfished situations, employment at sea is often reduced to the lowest feasible crewing levels on each vessel.

Low net revenues can result in limited resources available for vessel maintenance and investment in safety. Also, the need to fish intensively in a situation of low net revenue means that working hours are extremely long and fatigue levels are often dangerous. There is also a pressure to continue working even in unsafe weather conditions. The combination of these factors results in very high accident rates: this is by far one of the most dangerous occupations.

After a transitional phase and the recovery of stock, the industry could move to a situation of higher revenues with more possibilities for investment in safer vessels, shorter working hours, better pay and a lesser need to work in poor weather conditions. However, an overall reduction in fishing capacity and hence in employment may be needed in short-term.

The table below shows full time equivalent (FTE) for employment on the vessels in each fleet segment catching the largest proportion of the North Sea cod. The extent to which the employment is likely to be impacted is uncertain but will depend on the extent to which Member States are able to implement locally-suitable decoupling solutions.

Country	Gear	Length (m)	No. vessels	FTE (2005)
Denmark	DTS	12-24	265	621
	PGP	0-12	312	316
	PGP	12-24	116	318
UK	DTS	12-24	514	2076
	DTS	24-40	117	775
Germany	DTS	24-40	18	86
Belgium	TBB	24-40	52	352
Netherlands	TBB	40+	100	612

5.4 *Impacts on international relations*

The cod stock in the North Sea and Skagerrak is shared and jointly managed by the European Community and Norway. Decisions concerning the setting of TACs and associated questions are subject to agreement between the Community and Norway.

5.5 Impact summary

An option to improve control and an option to use economic instruments are not further analysed here as they have been identified as not being viable solutions in this case.

	1st Option: continue with current plan	2nd Option: closure of fisheries that catch cod	3rd Option: implement revised plan
Positive impacts	No change, the current rules remain ineffective to achieve stock recovery but are known by administrations and stakeholders.	Cod stock recovery will be achieved in shortest possible time. Other demersal stocks will improve in status. Positive impacts will appear in a time-frame of several years.	Stock recovery and long-term sustainability achieved as objective. A build-in mechanism to encourage MSs to avoid catching cod; the higher cod avoidance and discards reduction, the higher the total catch removals (TACs). The system establishes a level of detail that is possible for MSs to enforce and control. Effort based on kW-days ceilings adjusted directly in line with TAC. Simpler, easier and cheaper to enforce regime. More flexibility for MSs. Bottom-up management with increased stakeholder involvement.
Negative impacts	Stock recovery and long-term sustainability not assured as objective. Too many derogations that the system imposes, makes it not always possible for MSs to	Economic collapse of most demersal fishing sectors in northern European the short-term.	Short-term reduction in direct cod fishing.

	control. Effort based on days-at-sea undefined except for adjustment to over 100m sector and therefore not effective in reducing fishing effort. No flexibility for MSs. Top-down management.		
Direct impacts	Current measures not effective and not efficient enough for the recovery of stocks and reduction of discarding.	Very large reduction in supply of fresh demersal fish to European markets (sole, plaice, Nephrops, and haddock).	New measures more effective and efficient for improving state of stocks, conservation and reducing discards.
Indirect impacts	Negative economic, social and environmental impacts due to the possible stock collapse and the large amount of discards.	Disruption to market continuity. Likely replacement of fresh fish from European waters with imported fish and fish from aquaculture.	Positive economic, social and environmental impacts due to improved efficiency of revised measures leading to stock recovery.
Economic impacts	Negative impacts due to the possible stock collapse resulting in loss of profitability of the fishing industry	Significant employment problems in some coastal communities. Likely bankruptcy of substantial proportion of fishing enterprises.	Positive impacts due to stock recovery and maintained profitability of the industry.
Social impacts	Possible stock collapse resulting in drastic decline of employment in the fishing sector (i.e. UK and Danish demersal sector wiped out), very little integration with stakeholders, top-down approach and Brussels-based micro-management.	Massive disruption of employment in some coastal communities in the short term.	Medium negative impact in the short term, substantial positive impact in medium/long term due to stock recovery and maintained employment in the sector; Better regionalisation of management rules, better integration with stakeholders, bottom-up approach.
Environmental impacts	Negative impact on the conservation of species resulting in collapse of the stock and increased amount of discarding	Optimal result for marine environment.	Improvement on the conservation of stocks resulting in stock recovery, decrease of catch of juveniles, reduction of discards.

6. Comparing the options

Scientific advice, stakeholder consultations, discussions with Member States and the internal reflections of the Commission services lead to the same conclusion: the current cod recovery plan is not working adequately. Serious change is needed.

Five broad options have been considered.

The status quo option is rejected because experience has shown that it is not leading to cod recovery or is doing so unacceptably slowly.

The option to continue with the present regulation but to improve control is not supported. Although there are weaknesses in fisheries enforcement, this is not the main problem area because enforcement has improved recently and both landings and effort levels are broadly respected. Rather, problems lie in setting operational objectives and attaining them.

The option to close the fishery is rejected on the grounds of massive and extended disruption to the economic and social structure of fishing industry and lack in supply to consumers. Solutions have to be found that best combine reductions in fishing on cod with continuing fishing on other species.

The option to use economic incentives to encourage the avoidance of cod lies outside the present legislative scope of the Common Fisheries Policy. Although reductions in fleet size towards a sustainable level are encouraged and supported by co-funding instruments, more detailed economic intervention in matters traditionally managed by Member States is not appropriate at this time. It may be considered after the next reform of the Common Fisheries Policy.

DG FISH considers that improvements should be made to the existing cod recovery plan. These improvements should focus on making the operational objectives more specific, more measurable, more realistic and more attainable. However, as eventual cod recovery will be dependent on unknown future climatic factors, no time-frame for recovery can be projected.

The preferred measures are:

A change in management for stock-size increase towards reducing fishing mortality:

This is consistent with the objectives of the Common Fisheries Policy and the Johannesburg World Summit on Sustainable Development. Available scientific advice indicates that the highest yields of cod can be taken at a fishing mortality rate of between 0.2 to 0.4 per year but DG FISH chooses to propose the value of 0.4 as a target. This value (already agreed with Norway concerning North Sea cod) allows more fishing of fish other than cod in mixed fisheries. The proposal includes a provision to revise fishing mortality rates if scientific advice indicates that this is needed, and at intervals of no more than three years. In the event that forecasts of catches corresponding to fishing mortality rates are not available, there should be provisions for applying simple rules that will lead to similar result instead.

Decoupling Options:

In terms of regulatory simplification – and simplifying the operations of fishermen – the no-decoupling approach is attractive. However, in order to achieve a cod recovery under this approach, it would be necessary to bring overall effort levels down very substantially. Where cod remains the most commercially attractive fishery, it would tend to attract a disproportionate amount of effort. It would be difficult to manage the entire mixed fishery on the basis of the weakest stock.

Because of this, the "decoupling" approach is preferred by DG FISH and stakeholders as it allows an improved management of the stocks, with a better matching of the fishing effort and capacity to the productive potential of each of the resources. However, the management of decoupling having proven counterproductive in EC legislation, the preferred option is to devolve this matter to local management by Member States on the basis of cod avoidance plans.

Effort management:

DG FISH considers there are substantial gains to be made by adopting a kW-days system based on recent effort levels:

- a new scheme should start with effort levels ring-fenced at a recent level rather than on an unrealistically high historic figure;
- eliminating the complicated days-at-sea system contributes to simpler EC legislation and simpler enforcement by Member States;
- allowing Member States to implement cod avoidance measures allows each Member State to develop systems at a level of sophistication that is appropriate to their local conditions and enforcement capabilities.
- a new system could set area-based effort limits using separate zones relevant to each stock, as it is more likely to lead to effective recovery.
- under a stock specific effort management system it would be possible within each management unit to simplify the system by reducing the number of gear categories and to tailor stock specific measures.

The projected results of implementing this option are given in Annex 1. All values are expressed in € million.

This shows substantial gains for all fleets if the cod stocks recover and their TAC increases to 150,000 to 250,000 tonnes compared to the status quo scenario of a 21,000 TAC. However, the Danish small scale vessels (PG 00-12) would still not be profitable.

Decoupling effort in the long term has a very positive effect due to reduction in effort days and hence vessel costs (assuming that catch per unit of effort compensates the reduction in effort, i.e. that the TAC can be caught). However, as a general rule, we observe that the “no decouple” scenario yields a better outcome, due to the potential reductions in vessel costs for the whole fleet rather than just the vessels using 120mm gears.

It is observed that the Nephrops TAC reduction under a no decoupling scenario, assuming either a cod TAC of 150,000 or 250,000, does not result in big differences overall.

The no decouple scenarios for Germany, Belgium and Netherlands resulted in no significant differences in estimations compared to the decoupled effects.

Table 8: Status quo and decoupling simulations for Denmark

Fleet	Status quo long term Cod TAC 21,000 t		Scenario	Revised plan Cod TAC 150,000 t		Revised plan Cod TAC 250,000 t	
	Value of landings	Net profit/gross revenues		Value of landings	Net profit/gross revenues	Value of landings	Net profit/gross revenues
DTS 12-24m	56.3	-17.3%	Decoupling	88.1	3.7%	99.7	7.4%
			No decoupling	87.8	6.1%	98.0	9.7%
PG 0-12m	22.7	-33.2%	Decoupling	31.4	-13.7%	36.0	-10.0%
			No decoupling	31.4	-10.1%	36.0	-6.9%
PG 12-24m	25.8	-11.8%	Decoupling	59.7	19.9%	77.3	23.9%
			No decoupling	59.7	21.5%	77.3	25.2%

All Danish segments except PG 0-12 become profitable in the long term scenarios and show a significant improvement compared to the status quo. This is largely due to the high cod dependency of these fleets. Decoupling does not lead to a worsening or improvement in landing values. A no decoupling scenario improves profitability due to greater cost savings for the whole fleet as a result of the effort reduction.

Table 9: Status quo and decoupling simulations for the UK

Fleet	Status quo Cod TAC 21,000 t		Scenario	Revised plan Cod TAC 150,000 t		Revised plan Cod TAC 250,000 t	
	Value of landings	Net profit/gross revenues		Value of landings	Net profit/gross revenues	Value of landings	Net profit/gross revenues
DTS 12-24m	142	-9.3%	Decoupling	235.7	24.9%	251.4	28.3%
			No decoupling	224.9	24.6%	240.6	26.8%
DTS 24-40m	105	0.0%	Decoupling	215.5	32.2%	252.5	37.1%
			No decoupling	215.5	32.2%	252.4	36.3%

Both UK segments see significant increases in landing values and become profitable in the recovered cod stock scenarios, confirming their high dependency on cod. A no decoupled scenario worsens landing values and profit margins slightly, largely due to a reduction in Nephrops catches.

Table 10: Status quo and decoupling simulations for Germany

Fleet	Status quo Cod TAC 21,000 t		Scenario	Revised plan Cod TAC 150,000 t		Revised plan Cod TAC 250,000 t	
	Value of landings	Net profit/gross revenues		Value of landings	Net profit/gross revenues	Value of landings	Net profit/gross revenues
DTS 24-40m	33.3	66.1%	Decoupling	121.9	75.7%	121.9	75.7%
			No decoupling	-	-	-	-

The German fleet segment remains highly profitable in both status quo and cod recovery scenarios. We need to bear in mind that for the baseline and status quo, the net profits are already high due to extremely low costs. The increase in cod quota availability has a big impact in incrementing income. There is no distinguishable difference under a no decoupling scenario.

Table 11: Status quo and decoupling simulations for Belgium

	Status quo Cod TAC 21,000 t		Scenario	Revised plan Cod TAC 150,000 t		Revised plan Cod TAC 250,000 t	
	Value of landings	Net profit/gross revenues		Value of landings	Net profit/gross revenues	Value of landings	Net profit/gross revenues
TBB 24-40m	67.1	9.2%	Decoupling	84.5	16.6%	78.2	16.8%
			No decoupling	-	-	-	-

The Belgian beam trawlers, already profitable under current conditions, become more profitable in the long term. The improvements accrued in the sole and plaice fishery, by cutting operating costs and increasing the TAC, outweigh any potential impacts of cod recoveries to 150,000 and 250,000 tonnes.

Table 12: Status quo and decoupling simulations for the Netherlands

	Status quo Cod TAC 21,000 t		Scenario	Revised plan Cod TAC 150,000 t		Revised plan Cod TAC 250,000 t	
	Value of landings	Net profit/gross revenues		Value of landings	Net profit/gross revenues	Value of landings	Net profit/gross revenues
TBB 40+m	125.9	-15.8%	Decoupling	159.4	8.8%	147.5	8.9%
			No decoupling	-	-	-	-

The Dutch beam trawl segment becomes profitable in the long term under the two scenarios, in contrast to the status quo. The impact of a higher sole and plaice TAC is the driving factor, and probably explains why a higher cod TAC actually lowers the value of landings (although the profit margin is unaltered). The nuance between the decoupled/no decoupled scenarios does not apply to this segment.

Based on the above analysis, DG FISH considers that retaining the current regime would pose a high-risk approach for the sector in the longer term. Despite the recovery rules being in place since 2002, the cod stocks remain depleted and an alternative approach is necessary.

Therefore DG FISH considers the implementation of a revised plan to be advisable.

7. Monitoring and evaluation

The indicators of successful operation of this plan are that:

- Fishing mortality, as measured by ICES and STECF, decreases gradually until it reaches the target value of F0.4 established in the plan;
- the size of the spawning stock increases;

- TACs and quotas established according to the plan are respected and area misreporting is eliminated.

However it is clear that the current cod recovery regime has delivered less than expected, the evaluation of the implementation of the plan carried out since 2002, has resulted in clearer picture and more detailed information on cod fishery.

Based on the available data, the state of cod stocks will be monitored and analysed annually by ICES and STECF.

The main monitoring parameter will be the annual measurement of fishing mortality rate. This should gradually move towards its target value of 0.4. As a subsidiary matter, the Commission will monitor the uptake of TACs and of effort levels and will monitor discard rates.

Moreover, a detailed review of the plan will be carried out by STECF after three years of implementation. If the significant recovery of the stocks has not occurred, the Commission will tighten the rules by:

- further lowering the fishing effort;
- lowering TACs;
- introducing additional technical measures as necessary.

ANNEXES

Annex 1

Breakdown of projections for each option/scenario (€ million)

Denmark

Status Quo

DTS 12-24	2003-2005 baseline	Long term
Net profit / Gross revenues	-16.6%	-17.3%
	UNPROFITABLE	UNPROFITABLE
Value of landings	58.5	56.3
Crew share	31.8	30.6
Gross cash flow	0.5	0.5
Net profit	-9.7	-9.8
Gross value added	32.3	31.1

PG 00-12	2003-2005 baseline	Long term
Net profit / Gross revenues	-28.3%	-33.2%
	UNPROFITABLE	UNPROFITABLE
Value of landings	23.3	22.7
Crew share	16.2	15.7
Gross cash flow	-2.4	-2.4
Net profit	-6.6	-7.5
Gross value added	13.7	13.3

PG 12-24	2003-2005 baseline	Long term
Net profit / Gross revenues	-6.6%	-11.8%
	UNPROFITABLE	UNPROFITABLE
Value of landings	28.3	25.8
Crew share	15.4	14.0
Gross cash flow	3.0	2.8
Net profit	-1.9	-3.1
Gross value added	18.4	16.8

TAC 150,000: Decouple

Long term	DTS 12-24	PG 00-12	PG 12-24
Value of landings	88.1	31.4	59.7
Fuel costs	8.3	1.2	1.6
Other running costs	8.6	3.0	3.9
Vessel costs	9.9	4.7	4.0
Crew share	47.9	21.8	32.5
Gross cash flow	13.5	0.8	17.7
Depreciation	10.3	4.2	4.9
Interest	0.0	0.9	0.9
Net profit	3.3	-4.3	11.9
Gross value added	61.4	22.6	50.2
Net profit / Gross revenues	3.7%	-13.7%	19.9%
Classification	STABLE	UNPROFITABLE	PROFITABLE

TAC 150,000: No Decouple

Long term	DTS 12-24	PG 00-12	PG 12-24
Value of landings	87.8	31.4	59.7
Fuel costs	8.3	1.2	1.6
Other running costs	8.6	3.0	3.9
Vessel costs	7.5	3.5	3.0
Crew share	47.9	21.8	32.5
Gross cash flow	15.9	1.9	18.7
Depreciation	10.3	4.2	4.9
Interest	0.0	0.9	0.9
Net profit	5.4	-3.2	12.8
Gross value added	63.5	23.7	51.2
Net profit / Gross revenues	6.1%	-10.1%	21.5%
Classification	PROFITABLE	UNPROFITABLE	PROFITABLE

TAC 250,000: Decouple

Long term	DTS 12-24	PG 00-12	PG 12-24
Value of landings	99.7	36.0	77.3
Fuel costs	8.9	1.4	2.0
Other running costs	9.1	3.5	4.9
Vessel costs	9.9	4.7	4.0
Crew share	54.1	25.0	42.1
Gross cash flow	17.6	1.5	24.4
Depreciation	10.3	4.2	4.9
Interest	0.0	0.9	0.9
Net profit	7.4	-3.6	18.5
Gross value added	71.8	26.4	66.5
Net profit / Gross revenues	7.4%	-10.0%	23.9%
Classification	PROFITABLE	UNPROFITABLE	PROFITABLE

TAC 250,000: No Decouple

Long term	DTS 12-24	PG 00-12	PG 12-24
Value of landings	98.0	36.0	77.3
Fuel costs	8.6	1.4	2.0
Other running costs	8.9	3.5	4.9
Vessel costs	7.5	3.5	3.0
Crew share	53.2	25.0	42.1
Gross cash flow	19.8	2.6	25.3
Depreciation	10.3	4.2	4.9
Interest	0.0	0.9	0.9
Net profit	9.5	-2.5	19.5
Gross value added	73.0	27.6	67.4
Net profit / Gross revenues	9.7%	-6.9%	25.2%
Classification	PROFITABLE	UNPROFITABLE	PROFITABLE

United Kingdom

Status Quo

DTS 12-24	2003-2005 baseline	Long term
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Net profit / Gross revenues	-9.4%	-9.3%
	UNPROFITABLE	UNPROFITABLE
Value of landings	145	142
Crew share	42	42
Gross cash flow	5	5
Net profit	-14	-13
Gross value added	47	47

DTS 24-40	2003-2005 baseline	Long term
Net profit / Gross revenues	5.1%	5.0%
	STABLE	STABLE
Value of landings	111.6	105.4
Crew share	26.8	25.4
Gross cash flow	20.9	20.4
Net profit	5.7	5.3
Gross value added	47.7	45.8

TAC 150,000: Decouple

Long term	DTS 24-40	DTS 12-24
Value of landings	215.5	235.7
Fuel costs	25.5	28.8
Other running costs	43.3	49.2
Vessel costs	10.3	15.0
Crew share	51.9	65.5
Gross cash flow	84.5	77.2
Depreciation	15.2	18.5
Interest	0.0	0.0
Net profit	69.3	58.6
Gross value added	136.3	142.7
Net profit / Gross revenues	32.2%	24.9%
Classification	PROFITABLE	PROFITABLE

TAC 150,000: No Decouple

Long term	DTS 24-40	DTS 12-24
Value of landings	215.5	224.9
Fuel costs	25.5	27.2
Other running costs	43.3	46.4
Vessel costs	10.3	15.0
Crew share	51.8	62.5
Gross cash flow	84.5	73.8
Depreciation	15.2	18.5
Interest	0.0	0.0
Net profit	69.3	55.3
Gross value added	136.3	136.3
Net profit / Gross revenues	32.2%	24.6%
Classification	PROFITABLE	PROFITABLE

TAC 250,000: Decouple

Long term	DTS 24-40	DTS 12-24
Value of landings	252.5	251.4
Fuel costs	27.7	29.6

Other running costs	47.0	50.5
Vessel costs	8.1	11.9
Crew share	60.8	69.9
Gross cash flow	108.9	89.6
Depreciation	15.2	18.5
Interest	0.0	0.0
Net profit	93.8	71.1
Gross value added	169.7	159.5
Net profit / Gross revenues	37.1%	28.3%
Classification	PROFITABLE	PROFITABLE

TAC 250,000: No Decouple

Long term	DTS 24-40	DTS 12-24
Value of landings	252.4	240.6
Fuel costs	27.7	27.9
Other running costs	47.0	47.6
Vessel costs	10.3	15.0
Crew share	60.7	66.9
Gross cash flow	106.7	83.1
Depreciation	15.2	18.5
Interest	0.0	0.0
Net profit	91.6	64.6
Gross value added	167.5	150.0
Net profit / Gross revenues	36.3%	26.8%
Classification	PROFITABLE	PROFITABLE

Germany, Belgium and Netherlands

Status Quo

GER DTS 24-40	2003-2005 baseline	Long term
Net profit / Gross revenues	56.7%	66.1%
	PROFITABLE	PROFITABLE
Value of landings	17.1	33.3
Crew share	3.7	7.3
Gross cash flow	10.2	22.5
Net profit	9.7	22.0
Gross value added	13.9	29.8
BE TBB 24-40	2003-2005 baseline	Long term
Net profit / Gross revenues	9.6%	9.2%
	PROFITABLE	PROFITABLE
Value of landings	67.9	67.1
Crew share	24.8	24.5
Gross cash flow	11.5	11.3
Net profit	6.5	6.2
Gross value added	36.3	35.8
NL TBB 40+	2003-2005 baseline	Long term
Net profit / Gross revenues	-11.7%	-15.8%
	UNPROFITABLE	UNPROFITABLE
Value of landings	127.3	125.9

Crew share	30.6	30.3
Gross cash flow	6.2	1.2
Net profit	-14.8	-19.8
Gross value added	36.9	31.5

TAC 150,000: Decouple

Long term	GE DTS 24-40	BE TBB 24-40	NL TBB 40+
Value of landings	121.9	84.5	159.4
Fuel costs	1.1	22.8	48.5
Other running costs	0.5	5.6	24.4
Vessel costs	0.7	6.4	13.2
Crew share	26.6	30.0	38.4
Gross cash flow	92.8	19.7	35.0
Depreciation	0.5	4.8	21.1
Interest	0.0	0.9	0.0
Net profit	92.3	14.0	14.0
Gross value added	119.4	49.8	73.4
Net profit / Gross revenues	75.7%	16.6%	8.8%
Classification	PROFITABLE	PROFITABLE	PROFITABLE

TAC 250,000: Decouple

Long term	GE DTS 24-40	BE TBB 24-40	NL TBB 40+
Value of landings	121.9	78.2	147.5
Fuel costs	1.1	20.2	43.0
Other running costs	0.5	4.9	21.6
Vessel costs	0.7	6.4	13.2
Crew share	26.6	27.8	35.5
Gross cash flow	92.8	18.9	34.2
Depreciation	0.5	4.8	21.1
Interest	0.0	0.9	0.0
Net profit	92.3	13.1	13.1
Gross value added	119.4	46.7	69.7
Net profit / Gross revenues	75.7%	16.8%	8.9%
Classification	PROFITABLE	PROFITABLE	PROFITABLE

Annex 2:

Review of the recent state of the cod stock in terms of stock abundance and rate of exploitation with particular emphasis on signs of recovery since 2002

(1) Cod stock in the North Sea, Skagerrak and eastern Channel

Based on the most recent estimate of SSB and fishing mortality ICES classifies the stock as suffering reduced reproductive capacity and is harvested unsustainably (Fig. 2.1).

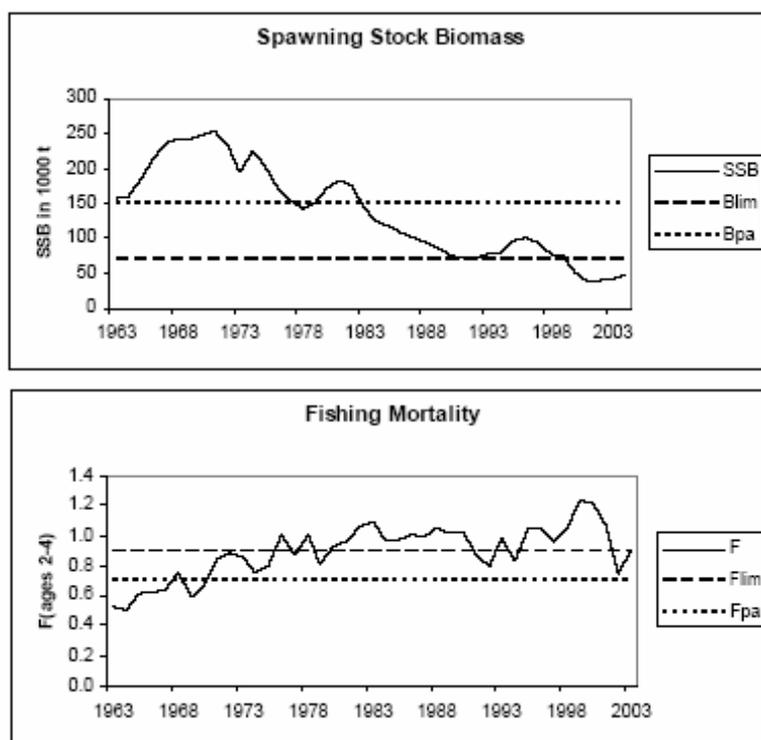


Fig. 2.1 Trends in SSB and fishing mortality in the cod stock in the North Sea, Skagerrak and eastern Channel (Div. 3an, 4 and 7d).

ICES classifies the stock as being harvested unsustainably and suffering reduced reproductive capacity. SSB is well below the Blim of 70,000t. Fishing mortality has shown a decline since 2000 and is currently estimated to be around Flim. The 2001-2004 year classes are all estimated to have been well below average; the 2005 year class is estimated from surveys to be more abundant, but still below average.

(2) Cod stock in the Kattegat

Based on the available evidence on SSB and fishing mortality ICES classifies the stock as having reduced reproductive capacity. Given the low stock size, the present fishing mortality is high and the stock is harvested unsustainably. The estimated SSB in 2004 is considerably below Blim (Fig. 2.2).

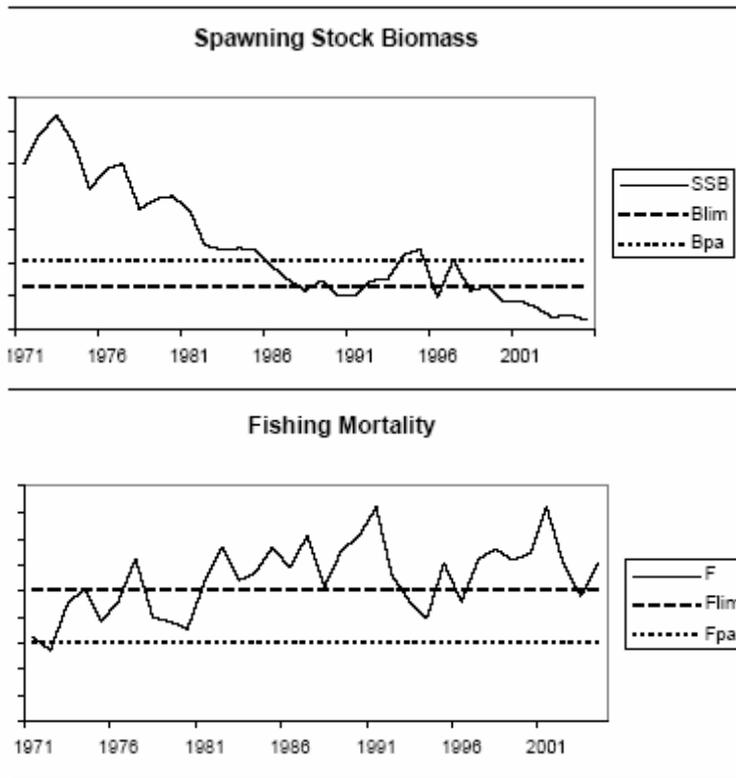


Fig. 2.2 Trends in SSB and fishing mortality in the cod stock in the Kattegat (Div. 3as).

All available data indicate that the Kattegat cod stock is at historically low levels with the spawning stock biomass well below biologically acceptable limit (Blim)¹⁸. Recruitment has been low in recent years. The fishing mortality has generally exceeded 1.0 since the early 1980s. The development in fishing mortality in recent years can not be assessed, however, results from research vessel surveys indicates that it has remained high. Even with no fishing in 2007, the stock is expected to remain below Blim. There is no sign of recovery for this stock under the existing regime.

(3) Cod stock west of Scotland

The state of the stock is uncertain. The survey SSB estimates indicate that the stock has been declining and is presently at a historical low. From survey estimates of mortality, there is no indication of a decline in overall mortality in recent years. Information from catch-at-age data also indicates that the stock is at a historical low (Fig. 2.3).

¹⁸ <http://www.intfish.net/glossary/terms/b.htm>

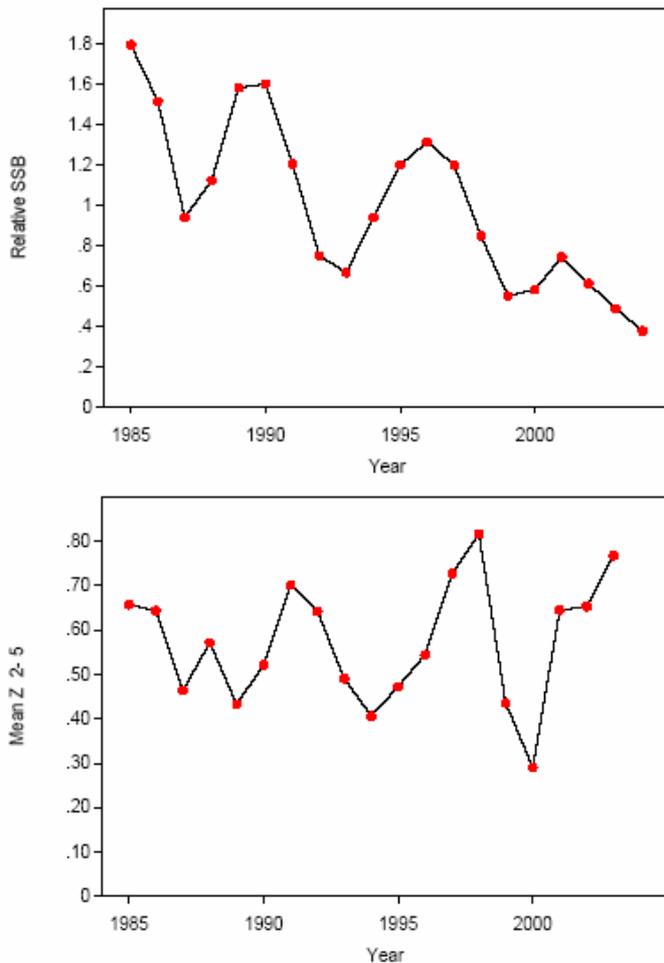


Fig. 2.3 Trends in relative SSB and total mortality in the cod stock west of Scotland (Div. 6a).

The spawning stock biomass is at an all time low. The rate of exploitation is uncertain but probably high. The survey SSB estimates indicate that the stock has been declining. Recruitment estimates indicate a decline in recruitment in the last decade, correlated with a decline in the spawning stock to the lowest levels observed. The stock is considered harvested unsustainably and suffering reduced reproductive capacity.

(4) Cod stock in the Irish Sea

Based on the most recent estimates of SSB and fishing mortality ICES classifies the stock as having reduced reproductive capacity and as being harvested unsustainably. Fishing mortality has been above F_{pa} since 1980 and close to, or above F_{lim} since 1989. SSB is below B_{pa} and has been below B_{lim} since 1995, and is projected to remain below B_{lim} in 2005 (Fig. 2.4).

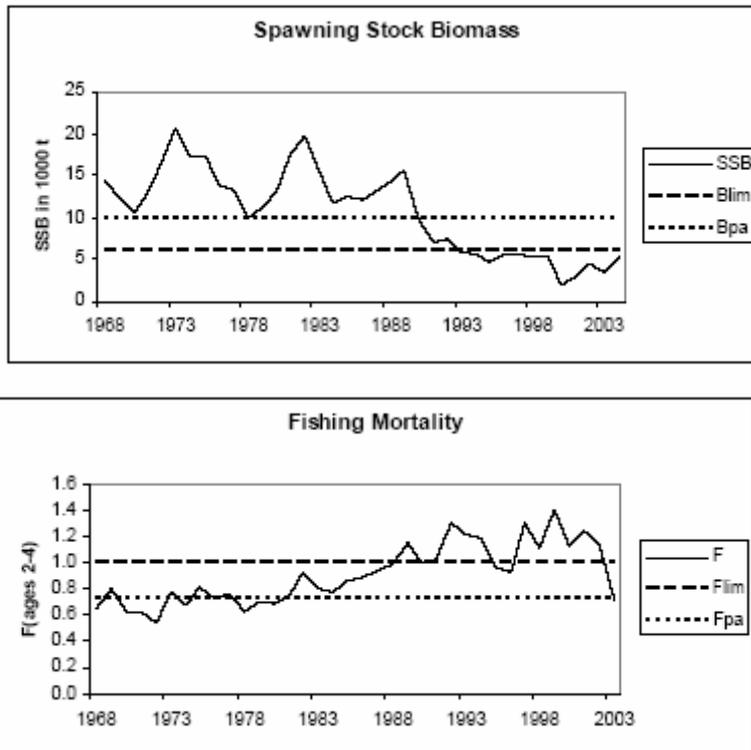


Fig. 2.4 Trends in SSB and fishing mortality in the cod stock in the Irish Sea (Div. 7a).

Based on the most recent estimates of SSB and fishing mortality, ICES classifies the stock as having reduced reproductive capacity and as being harvested unsustainably. Fishing mortality had been around F_{pa} until the mid-1980s. It has increased close to or above F_{lim} since the late 1980s. SSB is below B_{lim} since the mid-1990s.

Annex 3

Glossary

B

biological reference points – see limit reference points and safe biological limits.

biomass– the total weight of living matter, either by species or all species combined. Also referred to as the standing stock.

Blim – see limit reference points .

Bmsy – the spawning stock biomass (SSB) necessary to support a fishery that would produce the maximum sustainable yield (MSY).

Bpa – see limit reference points .

by-catch – the catch of non-target species and undersized fish of the target species. By-catch of commercial species may be retained or discarded along with non-commercial by-catch.

C

catch (C) – the total quantity of fish that is retained by fishing gear and brought onto the deck or fishing station, ie landings plus discards.

closed area – an area within which fishing by one or more methods of fishing, or fishing for one or more species of fish, is prohibited. Such areas may be permanently closed or be subject to closed seasons.

CFP – the Common Fisheries Policy of the European Union (as revised in: Council Regulation 3760/92). It provides the framework for the management of the EU fishery sector, including all marine fisheries within 200 miles of member states' baselines.

collapsed stock – the decline in spawning stock biomass (SSB), through sustained fishing pressure or natural causes, to the point where it no longer generates sufficient recruits to support a fishery.

D

days at sea – a means of measuring fishing effort. A potential management measure to limit fishing effort by restricting the number of days per month or year each vessel may fish.

demersal – species of fish that live on, or in close proximity to, the seabed, eg flatfish, cod, haddock. The term also applies to fishing gear that is worked on the seabed.

depleted stock – the decline in spawning stock biomass (SSB) to a level that is approaching, or is below, the lowest historic record but has not necessarily reached the point of collapse. (See also limit reference points and safe biological limits.)

derogation – a variation to, or temporary exemption from, EU legislation which enables an activity to be undertaken that would otherwise be prohibited. For example, the use of beam trawls might be prohibited in an area but there are derogations for shrimp trawlers which use a particularly light-weight beam trawl – sometimes known locally as ‘shank nets’. Conversely, a derogation might be granted for a temporary or local prohibition to be imposed in an otherwise ‘open’ area.

directed fishery – a fishery with a clearly defined target species, eg a pelagic fishing vessel may target herring or mackerel but invariably in different areas and at different times of year.

discards – any fish, or other living matter caught when fishing, that is not retained but returned to the sea – alive or dead.

effort (f) – the total quantity of fishing gear in use for a specific period of time (Ricker 1975). Effort can be expressed in a multitude of ways: days away from port, hours trawling, length of drift net, number of hooks used, and so on. At its most basic, it is the total number of boats engaged in a fishery and/or the number of days they were fishing.

effort control – a system of fishery management that focuses on limiting the quantity of fishing gear or the duration of its deployment rather than on limiting the quantity of catch that can be taken. (See also TAC and quota.)

environmentally sustainable fisheries – fisheries that safeguard the requirements of all animals and plants within an ecosystem or habitat and do not cause irreversible or other significant, long-term change to the environment or the communities of species that live within that environment.

exploited stock – any stock of fish that is subject to commercial fishing activity.

exploitation rate – the ratio of fish caught by fishing (F) to total mortality (Z).

F

F – formally, the instantaneous rate of fishing mortality (the natural logarithm of the change in abundance due to fishing per unit of time), but more simply, the proportion of the population killed each year by fishing.

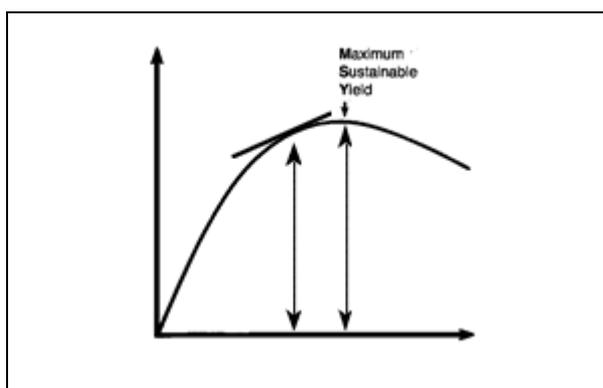


Figure 8: A generalised yield-per-recruit (YPR) curve showing the point at which the fishing mortality rate (F) is equivalent to the maximum sustainable yield (F_{msy}) and the point at which the slope of the curve is approximately 10% the slope of $F=0$, ie $F 0.1$.

F 0.1 – the estimate of fishing mortality (F) that corresponds to a point on the yield-per-recruit (Y/R) curve where the slope is 10% of the slope at the origin. It is an approximation to the level of fishing mortality that will generate the maximum sustainable yield (FMSY) when a more exact estimate is not possible (Fig. 8).

fish stock – scientifically, a population of a species of fish that is isolated from other stocks of the same species and does not interbreed with them and can, therefore, be managed independently of other stocks (cf gene pool). However, in EU legislation the term ‘stock’ is used to mean a species of fish living in a defined sea area, the two are not always synonymous (Holden 1994).

fishery conservation – the conservation and sustainable use of exploited fish stocks. It is the principal objective of UK and EU fisheries legislation; fishery management is the primary method through which the objective is pursued.

fishery limits – the European Commission (EC) holds ‘absolute competence’ for all aspects of fishery management within 200 nautical miles of member states’ baselines. Member states are responsible for enforcing fishery management measures on their own national fishing fleets and within their own sector of the 200 mile EU fishing limit. Member states may introduce and enforce national management measures within 12 nautical miles of baselines (the Territorial Sea), subject to the approval of DG Fisheries. Some EU member states and Norway have historic rights to fish in prescribed areas of the outer half of the UK Territorial Sea (6-12 nautical miles). All MS national fishery legislation is subject to approval by the EU (DG Fisheries) and must not be in conflict with EU legislation, nor can it be ‘discriminatory’, ie it must not favour one group of fishermen to the disadvantage of another group.

fishery management – the integrated process of information gathering, analysis, planning, decision making, allocation of resources, formulation and enforcement of fishery regulations which govern the present and future fishing activities in particular to ensure the continued productivity of the resources (EC 1999).

fishing effort – see effort.

fishing mortality rate – see F.

Flim – see limit reference points.

FMSY – the level of fishing mortality (F) that corresponds to the peak value on a dome-shaped yield-per-recruit curve and the value that will produce the maximum sustainable yield (MSY) from a fish stock (Fig. 8 & 10).

fishery management – the integrated process of information gathering, analysis, planning, decision making, allocation of resources, formulation and enforcement of fishery regulations which govern the present and future fishing activities in particular to ensure the continued productivity of the resources (EC 1999).

Fpa – see limit reference points.

G

gadoid – fish of the cod family, eg cod, haddock, Norway pout, pollack, saithe (coley), whiting, pout whiting and others.

gear – an all-embracing term for fishing equipment in total or in part, eg warps, long-line, tickler chains, bridles, dredges, etc.

growth overfishing – occurs where fish are caught before they are able to make their optimum (in terms of growth) individual contribution to exploited biomass. As a result, the stock as a whole is fished at a level where it cannot deliver the maximum sustainable yield (MSY).

I

ICES – the International Council for encourages research into commercial the Exploration of the Sea, an fish stocks, their biology and all factors independent scientific advisory body (natural and man made) that may founded in 1902. It is funded by 19 affect their abundance. It does not member states' governments from undertake research in its own right but around the North Atlantic (including has a secretariat (in Copenhagen) to Canada and the USA) and Baltic Sea. It facilitate and co-ordinate collaboration, including fishery stockassessments, between member states. Work is carried out through numerous working groups convened under the remit of one or more standing committees:

Advisory Committee of Fisheries Management (ACFM), Advisory Committee for the Marine Environment (ACME), Baltic Committee, Fisheries Technology Committee, Living Resources Committee, Mariculture Committee, Marine Habitat Committee, Oceanography Committee, Resource Management Committee.

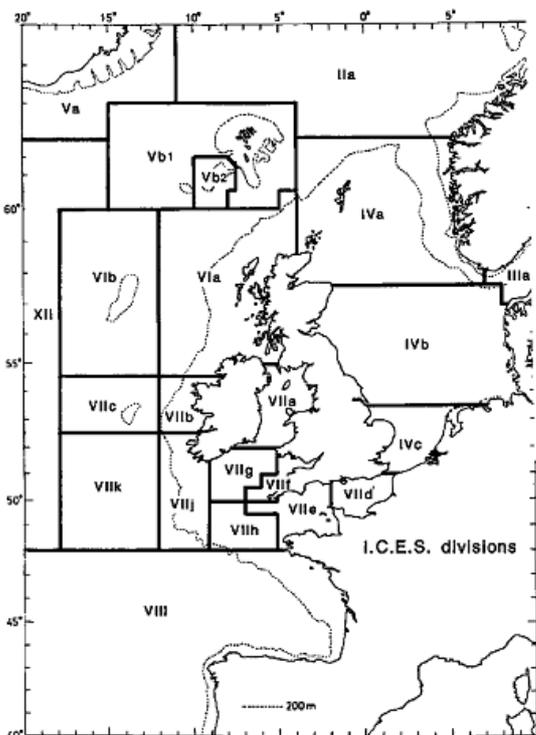


Figure 9: ICES sub-Areas (Roman numerals) and Divisions (Roman lower-case letters) around the British Isles

J

juvenile – an immature fish, ie one that has not reached sexual maturity (but could still be larger than the minimum landing size – MLS).

L

landings – that part of the catch which is put ashore. Frequently, landings provide the only record of total catch; ie the landings plus discards.

limit reference points – are biological or fishery management indicators that define the point at which precautionary action must be taken to safeguard a fish stock. In order for stocks and fisheries exploiting them to be within safe biological limits, there should be a high probability that: 1 – the spawning stock biomass (SSB = B) is above the threshold where recruitment is impaired; 2 - the fishing mortality (F) is below that which will drive the spawning stock to the biomass threshold, a condition that must be avoided. Thus: Blim = minimum acceptable biomass Flim = maximum acceptable fishing mortality (lim stands for ‘limit’). The certainty with which these points can be identified varies with the quality of assessment data available. Therefore, ICES has also identified precautionary reference points that identify higher biomass thresholds than Blim and lower fishing mortality thresholds than Flim:

Bpa = precautionary minimum biomass

Fpa = precautionary maximum fishing mortality (pa stands for precautionary approach).

In many instances, the value for Bpa will be the same as the value previously identified as the minimum biologically acceptable limit – MBAL (ICES 1998a and ICES Current). In circumstances where the relationship between the exploited stock and the spawning stock is not clear, as is the case with some of the deep-water species of fish, limit reference points may be expressed with respect to the ‘unexploited stock’:

- Ulim = minimum acceptable percentage of unexploited biomass
 - Upa = precautionary minimum percentage of unexploited biomass.
- (See ICES 1998b).

M

MSY - Maximum Sustainable Yield: the largest average catch that can be taken continuously from a stock under existing environmental conditions (Fig. 8). (For species with fluctuating recruitment, the maximum might be obtained by taking fewer fish in some years than in others). Also known as maximum equilibrium catch (Ricker 1975). (see also Figure 8).

misreporting – the inaccurate recording of catches in EU fishing log books or comparable reporting systems. Among the more common practices are under-reporting the quantity of fish caught or reporting the catch as being taken in a different area from the one in which it was actually made. The latter example is most widespread when the quota for a species in one ICES Division has been taken but quota is still available in an adjacent Division. (See also under-reporting and black-fish.)

mixed fishery – a fishery that takes multi-species catches. Pelagic fisheries tend to take relatively ‘clean’ single species catches whereas multi-species catches are more frequent in demersal fisheries.

monitoring – the regular and systematic collection of environmental and biological data by agreed methods and to agreed standards. Monitoring provides information on current status, trends and compliance with respect to declared standards and objectives. (See also surveillance.)

mortality – the death of organisms through natural causes (M), eg predation, or fishing (F) etc. It is usually expressed as an instantaneous rate: the natural logarithm (with sign changed) of the ratio of number of animals surviving to the end of the year and the number at the start of the year (Ricker 1975).

N

non-discriminatory – a basic principle of the CFP is that any management measures must not discriminate against, or be in favour of, one group of fishermen rather than another. This applies equally to EU and national legislation. For example, a ban on scallop dredging in a specified area must apply to all scallop dredgers from all ports, fleets and nations.

O

over-fishing – any fishery where the total fishing effort is greater than is required to meet or match a specific management objective, eg maximum sustainable yield (MSY). (See also growth overfishing and recruitment overfishing.)

P

precautionary approach – a decision to take avoiding action based on the possibility of significant environmental damage, even before there is conclusive evidence that damage will occur (DOE 1992). This approach requires fishery managers to pay due regard to the uncertainties of stock assessment and management. They must implement the appropriate precautionary action if limit reference points are reached.

precautionary TAC – a total allowable catch that is set for a particular stock or species but for which a full analytical stock assessment (eg virtual population analysis, VPA) is not possible or has not been made. It may be set on the basis of the average catch over the previous 5 years, for example, as a safeguard against over-exploitation.

productivity – the total biomass generated by a population, stock or species each year as a result of growth and reproduction – less the quantity lost through mortality.

Q

quota – a fixed proportion of the TAC allocated to each fishing nation. (See also relative stability .) This national quota allocation is further sub-divided into quotas for specific areas, seasons, fisheries or organisations, eg producer organisations (PO).

S

Spawning Stock Biomass – see SSB.

SSB– spawning stock biomass: the total weight of all sexually mature fish in a population or stock. It is the sexually mature part of an exploited population upon which the future survival of the stock, and its fishery, depends.

STECF – the Scientific, Technical and Economic Committee on Fisheries of the EC, DG Fisheries (Fig. 2). Unlike ICES working groups and ACFM (Fig. 3) which only consider stock assessments and management from a scientific perspective, the STEFC is expected to consider the socio- economic implications of modifying or varying scientific, including ICES' advice.

stock and recruitment – the notional relationship between the size of the (parent) spawning stock and the number of recruits joining that stock in later years. The probability is that a depleted stock will produce fewer recruits than an abundant stock of the same species but the nature of the relationship between these two extremes is not well understood.

stock assessment – the investigation, analysis and numerical description of the recent history and current state of a fish stock and the fishery that exploits it, ie distribution, abundance, size or age structure, abundance, size or age structure, fishing effort, catch rates etc.

stock biomass – the total weight of all fish of all ages in a given population or stock.

subsidiarity – devolution by the EU of responsibility to national or local government for meeting and enforcing EU policies, monitoring national catches and closing fisheries once the national quota is taken.

sustainability – meeting the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987 – the Brundtland Report).

sustainable development – development that meets the needs of the present without compromising the ability of future generations to meet their own needs (WCED 1987 – The Brundtland Report). Development that takes account of social and ecological factors, as well as economic ones; of the living and non-living resource base; and of the long-term as well as short-term advantages and disadvantages of alternative actions (IUCN 1980). Development integrating into all the relevant sectoral policies, at national and international level, the implications of economic growth on the environment, and seeking to satisfy the needs of the present and future generations equitably, in particular by allotting a value to environmental resources in order to identify and evaluate the economic activities on the environment (EC 1999).

sustainable fisheries – fisheries with an annual catch, including discards, that does not exceed the surplus production of the stock (ie annual growth plus recruitment less the annual natural mortality – M). Fisheries can be sustainable at levels of stock significantly below the stock that would support MSY or MEY but only if managers pay full regard to limit reference points. (See also environmentally sustainable fisheries .)

sustainable catch – see sustainable fisheries.

sustainable yield – see sustainable fisheries.

T

TAC – total allowable catch, the quantity of fish that can be taken from each stock each year. The figure is agreed by the Fisheries Council of Ministers each December for the following year. EU member states are allocated a fixed proportion of the TAC as their national quota. (See also relative stability and track record.)

target species – the primary species of fish that a fishing vessel aims to catch during a given fishing operation. In pelagic fisheries this can be a single species, eg herring or mackerel, but it is usually a group of species in demersal fisheries, eg cod and whiting or plaice and sole.

technical conservation measures – fishery management measures aimed primarily at the equipment used in fishing rather than the time and place they fish or what they catch, eg minimum mesh sizes (MMS), engine power, width of individual (eg scallop) dredges and the number towed by one boat. (See also biological conservation measures.)

U

under-reporting – failure to meet the legal requirement under the CFP to report fully and accurately all the fish that have been caught and landed. (MLS). It is an offence for anyone to (See also misreporting) retain or offer for sale undersize fish.

undersize fish – any fish that is less than the legal minimum landing size

Upa – see limit reference points.

Y

year class – all the fish in a population that were spawned in the same year, eg the ‘1998 year-class’.

yield per recruit – the mean long-term yield in weight from every individual fish that is recruited to the exploited stock.